Preface

Thank you for purchasing MD280 Series inverter.

This instruction manual describes how to use MD280 series inverter properly. Please completely understanding this user's manual before installing, operating, and maintenance or inspecting.

Safety Precautions
The drawings presented in this instructions are sometimes shown without covers or protective guards.Always replace the equipment's cover or protective guard as specified first,and the operate the products in accordance with the instructions. ● The drawings presented in the instructions are typical examples and may not match the product you received. ● These instructions are subject to change due to product improvement, specification modification, specification modification. ● If you want to order the manual due to loss or damage, please contact our company agents in each region or our company customer service center directly. ● If there is still any problem during using the product, please contact our company customer service center directly. ● Our Service Hotline: 400-777-1260.

MD280 series inverter is a genenral-purpose and multi-functional inverter developed by Inovance, which is based on the successful launching of MD300/MD320 and with the power-drive platform of MD300/320 that is has already been widely verified, as well as via the market research and customer demands.The entire system of MD series inverter has independent ventilation, which can be installed outside or inside the radiator cabinet,it can provide solutions to IP54 protection requirements,directly input DC bus terminal and DC powered fan that enable the standard products to be compatible with the DC bus running mode, perfect user password protection, shortcut menu design that makes the complex commission easier, reliable and safe.

MD280 series basic configuration and function are as follows:

I/O terminal	Five D1(DI can be selected as high-speed input port) 2×AI (AI2 can be selected as voltage or current input as well as keyboard potentiometer reference.) 2×DO 1×AO (can be selected as voltage/current input or frequency output or DO output via FM.) 1×Relay output
Control Mode	V/F
Analog setup Mode	Straight line mode
MS speed	Be abled to realize 8S speed
Sipmle PLC	Be abled to realize 8S timing operation
Swing frequency and fixed-length control	Available
Communication Function	Built-in 485 communication port
PID Control	Available
V/FMode	Linear V/F, Multi-point V/F, and Square V/F

MD280 series inverter has either built-in keyboard or external keyboard connecting to the operational panel via the standard RJ45 interface (once external keyboard is connected successfully, the built-in keyboard display will disappear automatically, and vice versa), facilitating the commissioning operation. All these features reflect the “Customer First” principle during the process of designing MD series inverters.

This manual serves as the guide to MD 280 operation. This manual

provides the user with issues and guidance on model selection, installation, parameter setup, onsite commissioning, troubleshooting and routine repair and maintenance. In order to use this series of inverters in a right manner, please read this manual prior to operation, and keep this manual properly for future reference. The customers with supporting equipment shall distribute this manual together with the equipment to the final user.

Unpacking for Check:

Upon unpacking, please confirm:

1. If the model and inverter rated value on the nameplate are consistent as the order. The box contains the equipment, certificate of conformity, user manual and warranty card.

2. If the product is damaged during the transportation. If there is any omission or damage, please contact our company or the supplier immediately.

Use for the first time:

For the users who use this product for the first time, please read this manual carefully prior to the use. If you have any doubt on certain functions and performances, please consult our technical support personnel for help so that you can use this product correctly.

This manual is subject to change without notice.

MD280 series inverter complies with the following international standards:

IEC/EN 61800-5-1: 2003 Safety Regulations on Speed Adjustable Electrical Drive System;

IEC/EN 61800-3:2004 Speed Adjustable Electrical Drive System; Part III: Electromagnetic Compatibility Standard and Specific Test Methods (It complies with IEC/EN 61800-3 standard if this product is installed and used properly according to Section 7.3.2 and Section 7.3.6).

Contact

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Connection to peripheral divices

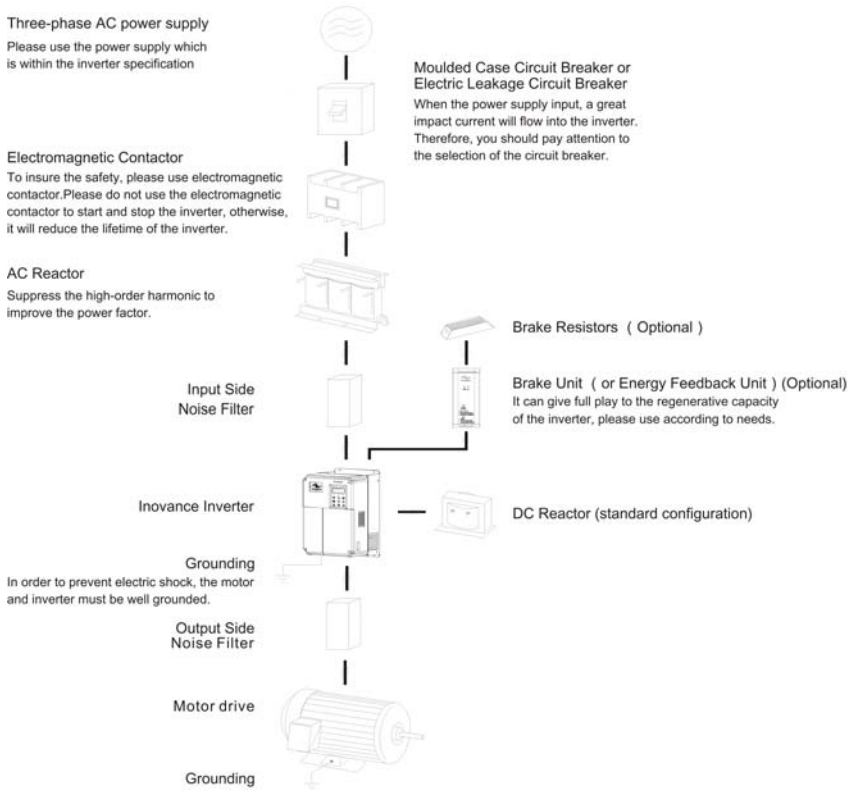

Three-phase AC power supply
Please use the power supply which is within the inverter specification
Moulded Case Circuit Breaker or Electric Leakage Circuit Breaker
When the power supply input, a great impact current will flow into the inverter. Therefore, you should pay attention to the selection of the circuit breaker.
Electromagnetic Contactor
To insure the safety, please use electromagnetic contactor.Please do not use the electromagnetic contactor to start and stop the inverter, otherwise, it will reduce the lifetime of the inverter.
AC Reactor
Suppress the high-order harmonic to improve the power factor.
Brake Resistors (Optional)
Input Side Noise Filter
Brake Unit (or Energy Feedback Unit) (Optional)
It can give full play to the regenerative capacity of the inverter, please use according to needs.
Inovance Inverter
DC Reactor (standard configuration)
Grounding
In order to prevent electric shock, the motor and inverter must be well grounded.
Output Side Noise Filter
Motor drive
Grounding

Diagram for the connection to peripheral divices

- Do not install the capacitor or surge suppressor at the output side of the inverter, otherwise it may cause inverter fault or capacitor and surge suppressor damaged.
- The input/output (main circuit) of the Inverter contains harmonic components, which may interfere with communications equipment of the inverter accessories.Therefore, install anti-interference filter so as to minimize interference.
- The details of peripheral equipments and accessories selection refer to the manual of peripheral equipments.

1

Safety and Precautions

Chapter 1 Safety and Precautions

Safety definition:

In this manual, safety precautions are divided into two types below:

Danger arising due to improper operations may cause severe hurt or even death.

Caution: Danger arising due to improper operations may cause moderate hurt or light hurt or equipment damage.

During the installtion, commissioning and maintenance of the system, plesase make sure to follow the safety precautions.Our company shall not take liable for any damage or troubles resulting from wrong operations.

1.1 Safety precautions

1.1.1 Before Installation:

Danger
● Do not use the damaged inverter or inverter with missing parts. Otherwise, there may be risk of injury. ● Please do not install when the packing list is inconsistent with the real name.

Danger
● Carefully handled when loading, otherwise it may damage the inverter. ● Please don’t use the damaged driver or missing parts inverter, there may be risk of injury. ● Do not touch components of the control system, otherwise it will cause static electricity.

1.1.2 During the Installation:

Danger
● Mount the inverter on incombustible surface like metal, and keep away from flammable substances. Otherwise it may cause fire. ● Do not loose the set screw of the equitment, especially the

screws marked in RED.

Caution

- Do not drop the lead wire stub or screw in the inverter. Otherwise it may damage the inverter.
- Please install the driver in the place where there is no direct sunlight or no vibratory.
- When more than two inverters are to be installed in one cabinet, due attention shall be paid to the installation locations (refer to Chapter 3 Mechanical and Electrical Installation to ensure the heat sinking effect.

1.1.3 During wiring:

Danger

- Operation shall be performed by the professional engineering technician. Otherwise there will be danger of electric shock.
- There shall be circuit breaker between the inverter and power supply. Otherwise, there may be fire.
- Make sure the power is disconnected prior to the connection. Otherwise there will be danger of electric shock.
- The earth terminal shall be earthed reliably. Otherwise there may be danger of electric shock.

Danger

- Do not connect the input power cable to the output ends U, V and W. Otherwise it may damage the inverter.
- Ensure the wiring meet the EMC requirements and the local safety standard. The wire size shall be determined according to the manual. Otherwise, accident may be caused!
- The brake resistor cannot be directly connected between the DC bus terminals (+) and (-). Otherwise it may cause fire.
- The shiled wire should be used for encoder, and the shielding layer shall be earthed reliably.

1.1.4 Before Power-on:

Caution

- Please confirm whether the power voltage class is consistent with the rated voltage of the inverter and whether the I/O cable connecting positions are correct, and check whether the external circuit is short circuited and whether the connecting line is firm. Otherwise it may damage the inverter.The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused.
- The inverter is free from dielectric test because this test is performed prior to the delivery. Otherwise accident may occur.

Danger

- The cover must be well closed prior to the inverter power-on. Otherwise electric shock may be caused!
- Whether all the external fittings are connected correctly in accordance with the circuit provided in this manual. Otherwise accident may occur.

1.1.5 Upon Power-on

Danger

- Do not open the cover of the inverter upon power-on. Otherwise there will be danger of electric shock!
- Do not touch the inverter and its surrounding circuit with wet hand. Otherwise there will be danger of electric shock.
- Do not touch the inverter terminals (including control terminal). Otherwise there will be danger of electric shock.
- At power-on, the inverter will perform the security check of the external heavy-current circuit automatically. Thus, at this time please do not touch the terminals U, V and W, or the terminals of motor, otherwise there will be danger of electric shock.

Danger

- If the parameter identification is required, pay attention to the danger of injury arising from the rotating motor. Otherwise accident may occur.
- Do not change the factory settings at will. Otherwise it may damage the equipment.

1.1.6 During the operation:

Danger

- Do not touch the fan or discharge resistor to sense the temperature. Otherwise, you may get burnt.
- Detection of signals during the operation shall only be conducted by qualified technician. Otherwise, personal injury or equipment damage may be caused.

Caution

- During the operation of the inverter, keep items from falling into the equipment. Otherwise, it may damage the equipment.
- Do not start and shut down the inverter by connecting and disconnecting the contactor. Otherwise, it may damage the equipment.

1.1.7 During Repair

Danger

- Do not repair and maintain the equipment with power connection. Otherwise there will be danger of electric shock.
- Be sure to conduct repair and maintenance after the charge LED indictor of the inverter is OFF. Otherwise, the residual charge on the capacitor may cause personal injury.
- The inverter shall be repaired and maintained only by the qualified person who has received professional training. Otherwise, it may cause personal injury or equipment damage.
- Carry out parameter setting after replacing the inverter, all the plug-ins must be plug and play when power outage.

1.2 Precautions

1.2.1 Motor Insulation Inspection

When the motor is used for the first time, or when the motor is reused after being kept, or when periodical inspection is performed, it shall conduct motor insulation inspection so as to avoid damaging the inverter because of the insulation fault of the motor windings. The motor wires must be disconnected from the inverter during the insulation inspection. It is recommended to use the 500V megameter, and the insulating resistance measured shall be at least 5MΩ.

1.2.2 Thermal Protection of the Motor

If the ratings of the motor does not match those of the inverter, especially when the rated power of the inverter is higher than the rated power of the motor, the relevant motor protection parameters in the in the inverter shall be adjusted, or thermal relay shall be mounted to protect the motor.

1.2.3 Running with Frequency higher than Standard Frequency

This inverter can provide output frequency of 0Hz to 300Hz. If the user needs to run the inverter with frequency of more than 50Hz, please take the resistant pressure of the mechanical devices into consideration.

1.2.4 Vibration of Mechanical Device

The inverter may encounter the mechanical resonance point at certain output frequencies, which can be avoided by setting the skip frequency parameters in the inverter.

1.2.5 Motor Heating and Noise

Since the output voltage of inverter is PWM wave and contains certain harmonics, the temperature rise, noise and vibration of the motor will be higher than those when it runs at standard frequency.

1.2.6 Voltage-sensitive Device or Capacitor Improving Power Factor at the Output Side

Since the inverter output is PWM wave, if the capacitor for improving the power factor or voltage-sensitive resistor for lightning protection is mounted at the output side, it is easy to cause instantaneous over current in the inverter, which may damage the inverter. It is recommended that such devices not be used.

1.2.7 Switching Devices like Contactors Used at the Input and Output terminal

If a contactor is installed between the power supply and the input terminal of the inverter, it is not allowed to use the contactor to control the startup/stop of the inverter. If use of such contactor is unavoidable, it shall be used with interval of at least one hour. Frequent charge and discharge will reduce the service life of the capacitor inside the inverter. If switching devices like contactor are installed between the output end of the inverter and the motor, it shall ensure that the on/off operation is conducted when the inverter has no output. Otherwise the modules in the inverter may be damaged.

1.2.8 Use under voltage rather than rated voltag

If the MD series inverter is used outside the allowable working voltage range as specified in this manual, it is easy to damage the devices in the inverter. When necessary, use the corresponding step-up or step-down instruments to change the voltage.

1.2.9 Change Three-phase Input to Two-phase Input

It is not allowed to change the MD series three-phase inverter into two-phase one. Otherwise, it may cause fault or damage to the inverter.

1.2.10 Lightning Impulse Protection

The series inverter has lightning over current protection device, and has certain self-protection capacity against the lightning. In applications where lightning occurs frequently, the user shall install additional protection devices at the front-end of the inverter.

1.2.11 Altitude and Derating

In areas with altitude of more than 1,000 meters, the heat sinking effect of the inverter may turn poo rer due to rare air. Therefore, it needs to derate the inverter for use. Please contact our company for technical consulting in case of such condition.

1.2.12 Certain Special Use

If the user needs to use the inverter with the methods other than the recommended wiring diagram in this manual, such as shared DC bus, please consult our company.

1.2.13 Cautions of Inverter Disposal

The electrolytic capacitors on the main circuit and the PCB may explode

when they are burnt.Emission of toxic gas may be generated when the plastic parts are burnt. Please dispose the inverter as industrial wastes.

1.2.14 Adaptable Motor

1) The standard adaptable motor is four-pole squirrel-cage asynchronous induction motor. If such motor is not available, be sure to select adaptable motors in according to the rated current of the motor. In applications where drive permanent magnetic synchronous motor is required, please consult our company.

2) The cooling fan and the rotor shaft of the non-frequency-conversion motor adopt coaxial connection. When the rotating speed is reduced, the heat sinking effect will be poorer. Therefore, a powerful exhaust fan shall be installed, or the motor shall be replaced with frequency conversion motor to avoid the overheating of the motor.

3) Since the inverter has built-in standard parameters of the adaptable motors, it is necessary to perform motor parameter identification or modify the default values so as to comply with the actual values as much as possible, or it may affect the running effect and protection performance;

4) The short circuit of the cable or motor may cause alarm or explosion of the inverter. Therefore, please conduct insulation and short circuit test on the newly installed motor and cable. Such test shall also be conducted during routine maintenance. Please note that the inverter and the test part shall be completely disconnected during the test.

2

Product Information

Chapter 2 Product Information

2.1 Designation Rules

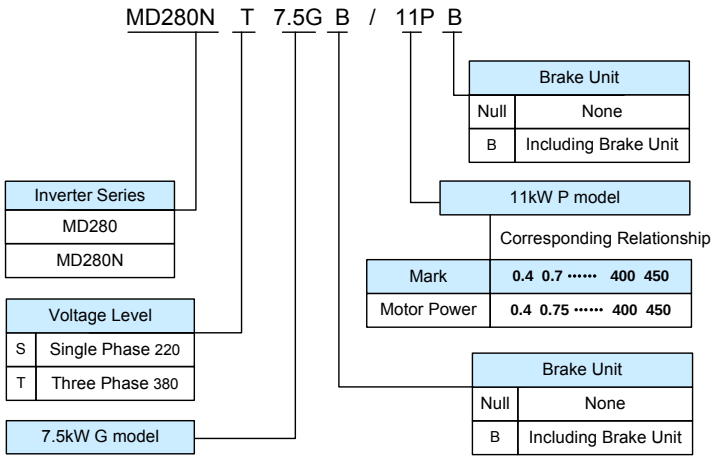


Fig.2-1 Designation Rules

Caution: The MD280N series is an upgrade of the MD280 series in terms of external appearance and structural design. Except for special notes on the MD320N, all the following information is appropriate for the MD320N series of products.

2.2 Nameplate

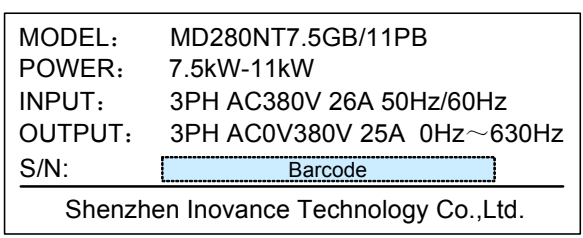


Fig.2-2 Nameplate

2.3 MD280 Series Inverter

Table 2-1 MD280 Inverter Model and Technical Data

Inverter model	Input Voltage	Power capacity (kVA)	Input current (A)	Rated Output current (A)	Adaptable Motor (kW)
MD280S0.4G	Single Phase Range: -15% to 20%	1.0	5.4	2.3	0.4
MD280S0.7G		1.5	8.2	4.0	0.75
MD280S1.5G		3.0	14.0	7.0	1.5
MD280S2.2G		4.0	23.0	9.6	2.2
MD280T0.7G	Three-Phase Range: -15% to 20%	1.5	3.4	2.1	0.75
MD280T1.5G		3.0	5.0	3.8	1.5
MD280T2.2G		4.0	5.8	5.1	2.2
MD280T3.7G/5.5P		8.9	14.6	9.0/13.0	3.7/5.5
MD280T5.5G/7.5P		11.0	20.5	13.0/17.0	5.5/7.5
MD280T7.5G/11P		17.0	26.0	17.0/25.0	7.5/11
MD280T11G/15P		21.0	35.0	25.0/32.0	11/15
MD280T15G/18.5P		24.0	38.5	32.0/37.0	15/18.5
MD280T18.5G/22P		30.0	46.5	37.0/45.0	18.5/22
MD280T22G/30P		40.0	62.0	45.0/60.0	22/30
MD280T30G/37P		57.0	76.0	60.0/75.0	30/37
MD280T37G/45P		69.0	92.0	75.0/91.0	37/45
MD280T45G/55P		85.0	113.0	91.0/112.0	45/55
MD280T55G/75P		114.0	157.0	112.0/150.0	55/75
MD280T75G/90P		134.0	180.0	150.0/176.0	75/90
MD280T90G/110P		160.0	214.0	176.0/210.0	90/110
MD280T110G/132P		192.0	256.0	210.0/253.0	110/132
MD280T132G/160P		231.0	307.0	253.0/304.0	132/160
MD280T160G/200P		250.0	385.0	304.0/377.0	160/200
MD280T200G/220P		280.0	430.0	377.0/426.0	200/220
MD280T220G/250P		355.0	468.0	426.0/465.0	220/250
MD280T250G/280P		396.0	525.0	465.0/520.0	250/280
MD280T280G/315P		445.0	590.0	520.0/585.0	280/315
MD280T315G/355P		500.0	665.0	585.0/650.0	315/355

Inverter model	Input Voltage	Power capacity (kVA)	Input current (A)	Rated Output current (A)	Adaptable Motor (kW)
MD280T355G/400P		565.0	785.0	650.0/725.0	355/400
MD280T400G/450P		630.0	883.0	752.0/820.0	400/450

Table 2-2 MD280 Inverter Model and Technical Data

Inverter model	**Input Voltage**	**Power Supply**	**Input Current**	**Output Current**	**Adaptable Motor（kW）**
MD280NS0.4	Single Phase Range: -15% to 20%	1.0	5.4	2.3	0.4
MD2800NS0.7		1.5	8.2	4.0	0.75
MD280NS1.5		3.0	14.2	7.0	1.5
MD280NS2.2		4.0	23.0	9.6	2.2
MD280NT0.7	Three Phase Range: -15% to 20%	1.5	3.4	2.1	0.75
MD280NT1.5		3.0	5.0	3.8	1.5
MD280NT2.2		4.0	5.8	5.1	2.2
MD280NT3.7G/5.5P		5.9	14.6	9.0/13.0	3.7
MD280NT5.5G/7.5P		8.9	20.5	13.0/17.0	5.5
MD280NT7.5G/11P		11.0	26.0	17.0/25.0	7.5
MD280NT11G/11P		17.0	35.0	25.0/32.0	11.0
MD280NT15G/18.5P		21.0	38.5	32.0/37.0	15.0
MD280NT18.5G/22P		30.0	46.5	37.0/45.0	18.5/22
MD280NT22G/30P		40.0	62.0	45.0/60.0	22/30
MD280NT30G/37P		57.0	76.0	60.0/75.0	30/37
MD280NT37G/45P		69.0	92.0	75.0/91.0	37/45
MD280NT45G/55P		85.0	113.0	91.0/112.0	45/55
MD280NT55G/75P		114.0	157.0	112.0/150.0	55/75

2.4 Technical Specifications

Table 2-3 MD320 Inverter Technical Specifications

Item		Specifications
Basic function	Maximum frequency	630Hz
	Carrier frequency	0.5k to 16kHz; the carrier frequency will be automatically adjusted according to the load characteristics.
	Input frequency resolution	Digital setting: 0.01Hz Analog setting: maximum frequency ×0.1%
	Control mode	V/F control Vector flux control
	Startup torque	150%
	Speed adjustment range	1：50
	Speed stabilization precision	±1%
	Overload capacity	G model: 150% rated current 60s; P model: 130% rated current 60s;
	Torque hoist	Automatic torque hoist; manual torque hoist 0.1% to 30.0%
	V/F curve	Linear V/F, Multi-point V/F, and Square V/F
	Speed-up and Speed-down curve	Straight line or S curve speed-up and speed-down mode; Two kinds of speed-up and speed-down time; Speed-up and speed-down time ranges between 0.0s to 3000.0min.
	DC brake	DC brake frequency: 0.00Hz to maximum frequency; brake time: 0.0s to 36.0s, and brake current value: 0.0% to 100.0%.
	Jog control	Jog frequency range: 0.00Hz to 50.00Hz; jog speed-up/speed-down time: 0.0s to 3000.0s.

Item		Specifications
	Simple PLC and MS speed running	It can realize a maximum of 8 segments speed running via the built-in PLC or control terminal.
	Built-in PID	It is easy to realize process-controlled close loop control system.
	（AVR）Auto voltage regulation (AVR)	It can keep constant output voltage automatically in case of change of mains voltage.
	Stall over current control	It can limit the torque automatically and prevent frequent over current tripping during the running process.
	Quick current limit	Minimize the over-current fault, protect normal operation of the inverter
Individua-lized function	Peripherals self-detection upon power-on	It can conduct safety detections on the peripherals upon power-on, including earth and short circuit detections.
	Shared DC bus function	It can realize the function that multiple inverters share the DC bus.
	MF.K key	Programmable key: Select the command channel switching/forward and reverse rotations/jog operation.
	Textile swing frequency control	Multiple triangular-wave frequency control function
	Timing control	Timing control function: Setting time range between 0h to 65535 h.
Run	Running command channel	Three types of channels: operation panel reference, control terminal reference and serial communication port reference. These channels can be switched in various modes.
	Frequency source	There are totally eight types of frequency sources, such as digital reference, analog voltage reference, analog current reference, pulse reference, MS speed, PLC, PID, and serial port reference.

Item		Specifications
	Input terminal	There are five digital input terminals, one of which can be used as high-speed pulse input. There are two analog input terminals. AI1 can be used only as voltage input, while AI2 can be used as voltage or current input. (It can be selected to keyboard potentiometer input via the jumper.)
	Output terminal	Two digital output terminals One relay output terminal One analog output terminal (can be expanded to two), with optional 0//4mA to 20mA or 0/2V to 10V. It can realize the output of such physical parameters as setting frequency and output frequency,while via FM to output 0kHz to 50kHz square-wave signal. DO3 can also be set to open-collector output. (AO, FM, DO3 share a channel, making a distinction via the function selection.)
Display and Keyboard Operation	LED display	The machine has the LED keyboard,and realize parameter settings, status monitoring function
Others	Protection function	It can implement power-on motor short-circuit detection, input/output phase loss protection, over current protection, over voltage protection, under voltage protection, overheating protection and overload protection.
	Optional parts	Optional external keyboard(which has two selection ,one is with the potentiometer,the other is without the potentiometer), braking components and external keyboard cable,etc.
Environment	Using place	Indoor, and be free from direct sunlight, dust, corrosive gas, combustible gas, oil smoke, vapor, drip or salt.
	Altitude	1000m, derated when above 1000m
	Ambient temperature	-10 ℃ Celsius to +40 ℃ Celsius (Derated when used in the ambient temperature of 40 ℃ Celsius to 50 ℃ Celsius)
	Humidity	Less than 95%RH, without condensing
	Vibration	Less than 5.9 m/s^2(0.6g)

Item		Specifications
	Storage temperature	-20 Celsius to +60 Celsius

2.5 Physical Appearance and Dimensions of Mounting Hole

2.5.1Product Appearance

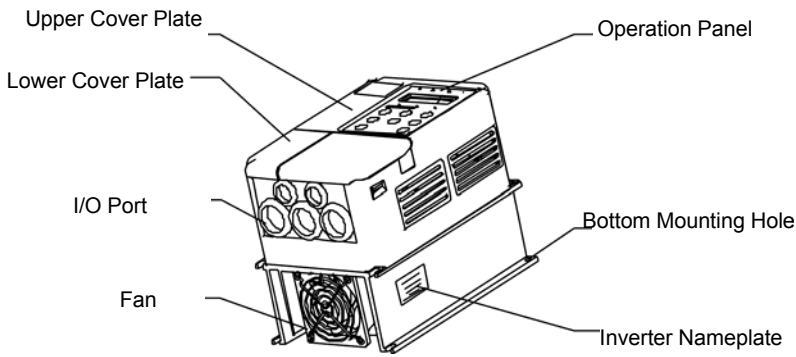


Fig.2- 1 Physical Appearance of Inverter

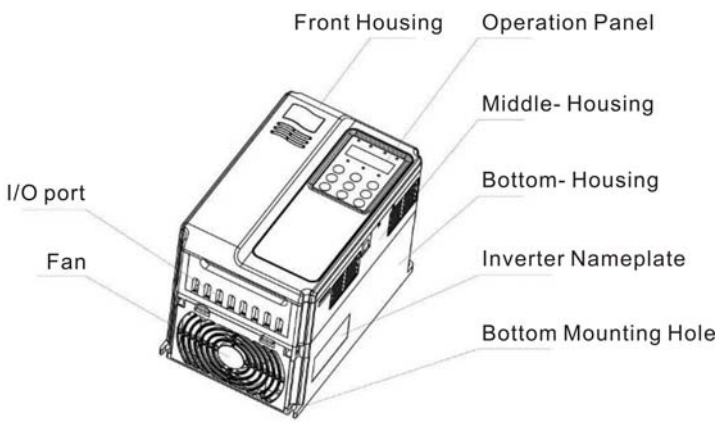


Fig.2- 2 Inverter Appearance of MD280N

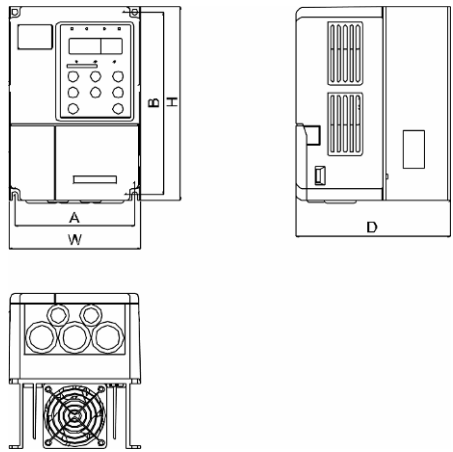


Fig.2-5 Schematic Diagram for Physical Dimensions and Mounting Dimensions of MD280S0.4G to MD280T15G/18.5P

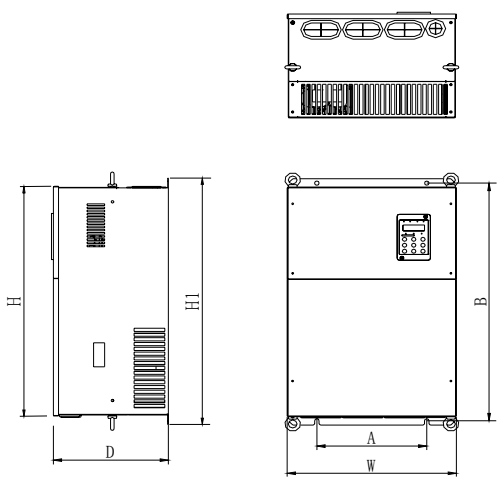


Fig.2-6 Schematic Diagram for Physical Dimensions and Mounting Dimensions of MD280T18.5G/22P to MD280T400G/450P

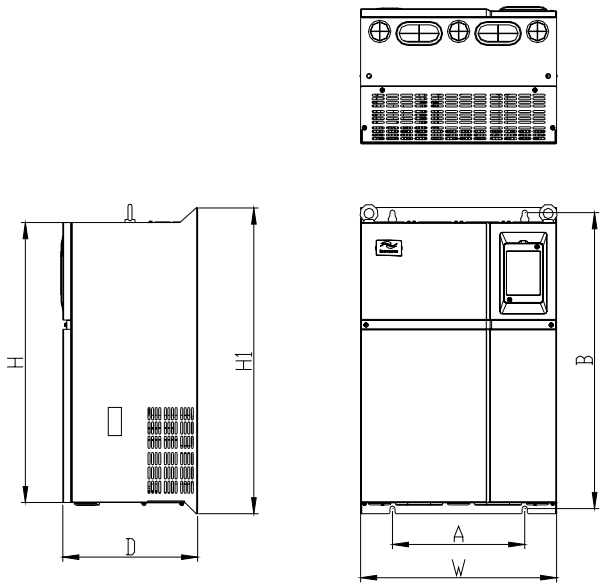


Fig.2-3 Schematic Diagram for Physical Dimensions and Mounting Dimensions of MD280NT18.5G/22P to MD280NT400G/450P

2.5.2 Mounting Hole Dimensions

Table 2-3 Mounting Hole Dimensions of MD280 Series Inverter（mm）

Model	Mounting Hole		Physical Dimension				Diameter of Mounting Hole	Weight (kg)
	A	B	H	H1	W	D		
MD280S0.4G	113	172	182	/	123	145	φ5.4	1.1
MD280S0.7G								
MD280S1.5G								
MD280S2.2G								
MD280T0.7G								
MD280T1.5G								
MD280T2.2G								
MD280T3.7G/5.5P	147	236	246	/	158	165	φ5.4	2.5
MD280T5.5G/7.5P								
MD280T7.5G/11P	150	335	322	348	224	177	Φ6	7
MD280T11G/15P								
MD280T15G/18.5P								
MD280T18.5G/22P	235	447	430	460	285	220	φ6.5	20
MD280T22G/30P								
MD280T30G/37P								
MD280T37G/45P	250	598	573	620	380	262	φ10	34
MD280T45G/55P								
MD280T55G/75P								
MD280T75G/90P	343	678	660	700	473	307	φ10	47
MD280T90G/110P								
MD280T110G/132P	449	905	880	930	579	375	φ10	90
MD280T132G/160P								
MD280T160G/200P	320	1168	1049	1192	440	334	φ10	98
MD280T200G/220P	420	1030	983	1060	650	377	φ12	130
MD280T220G/250P								
MD280T250G/280P								
MD280T280G/315P								
MD280T315G/355P	520	1300	1203	1358	800	400	φ14	200
MD280T355G/400P								

Model	Mounting Hole		Physical Dimension				Diameter of Mounting Hole	Weight (kg)
	A	B	H	H1	W	D		
MD280T400G/450P								

Table 2-5 Mounting Hole Dimensions of MD280N Series Inverter（mm）

Model	Mounting Hole		Physical Dimension				Diameter of Mounting Hole	Weight (kg)
	A	B	H	H1	W	D		
MD280NS0.4G MD280NS0.7G MD280NS1.5G MD320NS2.2G MD280NT0.7G MD280NT1.5G MD280NT2.2G	113	172	186	/	125	164	Φ5.0	1.1
MD280NT3.7G MD280NT5.5G/7.5P	148	236	248	/	160	183	φ5.0	2.5
MD280NT7.5G/11P* MD280NT11G/15P* MD280NT15G/18.5P*	190	305	322	/	208	192	φ6	6.5
MD280NT18.5G/22P* MD280NT22G/30P* MD280NT30G/37P*	235	447	432	463	285	228	φ6	20
MD280NT37G/45P* MD280NT45G/55P* MD280NT55G/75P*	260	580	549	600	385	265	φ10	32
MD280NT75G/90P MD280NT90G/110P	343	678	660	700	473	307	φ10	47

Model	Mounting Hole		Physical Dimension				Diameter of Mounting Hole	Weight (kg)
	A	B	H	H1	W	D		
MD280NT110G/132P MD280NT132G/160P	449	905	880	930	579	375	φ10	90
MD280NT200G/220P MD280NT220G/250P MD280NT250G/280P MD280NT280G/315P	420	1030	983	1060	650	377	φ12	130
MD280NT315G/355P MD280NT355G/400P MD280NT400G/450P	520	1300	1203	1358	800	400	φ14	200

Caution: The mounting hole dimension of MD280 series inverter is not compatible with the MD280 inverter.

1) Physical Dimensions of External Keyboard

2) Mounting Hole Dimensions of External Keyboard

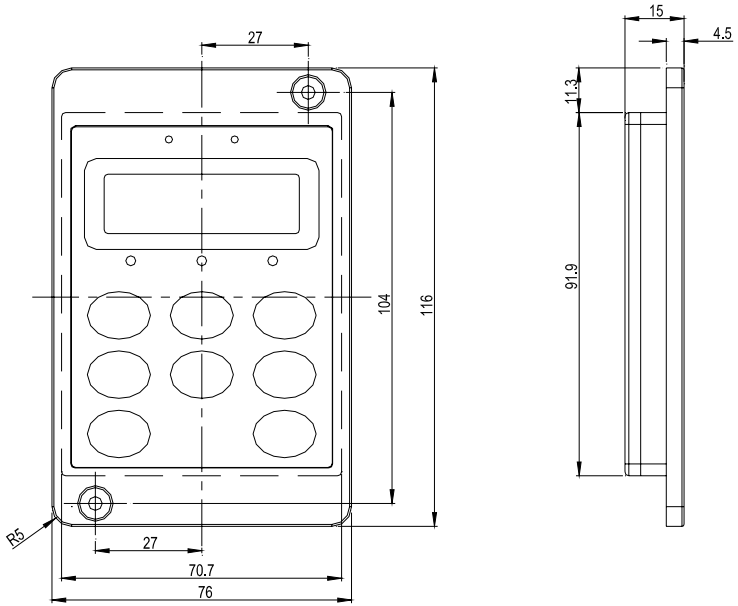


Fig.2-8 Schematic Diagram for Physical Dimensions of External Keyboard

Fig.2-9 Schematic Diagram for Mounting Hole Dimension of External Keyboard

3）Schematic Diagram for Dimension of External Reactor

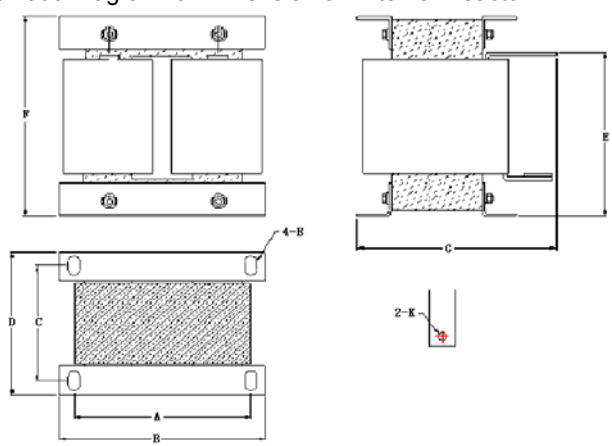


Fig.2-10 Schematic Diagram for Dimensions of External Reactor

Table 2-6 External Reactor Dimension Table （mm）

Inverter Mode	A	B	C	D	E	F	G	Mounting Hole	Connection Diameter Hole of Copper Medal
MD280T75G/90P 、90G/110P 、110G/132P	160	190	125	161	192	255	195	10*15	φ12
MD280T132G/160P、160G/200P	160	190	125	161	192	255	195	10*15	φ12
MD280T200G/220P、220G/250P	190	230	93	128	250	325	200	13*18	φ15
MD280T250G/280P、280G/315P	190	230	93	128	250	325	200	13*18	φ15
MD280T315G/355P、355G/400P 、400G/450P	224	250	135	165	260	330	235	12*20	φ14

Caution: Non-standard may be ordered for special requirements.

*External DC reactor installation mode:

MD280 series inverter of more than 75kW produced by Inovance all employs standard external DC reactor, which is packed in independent wooden box and delivered together with the inverter. When mounting the inverter, the user needs to remove the short circuit bus between the terminals P and (+) of the main circuit of the inverter and then connect the DC reactor between P and (+). There is no polarity between the reactor terminal and the inverter terminals P and (+). After the DC reactor is mounted, the short circuit bus between P and (+) will not be used.

2.6 Optional Parts

Table 2-7 Optional Parts of MD280 Inverter

Name	Model	Function	Remark
Built-in brake unit		Standard configured built-in brake unit of inverter of below 15G/18.5P Built-in brake unit of inverter of 18.5G/22P to 30G/37P	Built-in brake unit of three phase slave 0.75kW to 15G/18.5P is standard configuration.
External brake unit	MDBU-70-B	External built-in brake unit of inverter of over 37G/45P	55G/75P or above is required, it can employ the parallel mode.
External LED operation panel without potentiometer	MDKE2	External LED display and operation keyboard	External A12 input is used
External LED operation panel with potentiometer	MD28KE2	External LED display and operation keyboard	Take the potentiometer on the keyboard as AI2 input
Extended cable	MDCAB	Standard 8-core network cable is used as the extended cable for the external keyboard.	Standard Configuration of 3m

If you need such option parts, please specify when placing the order.

2.7 Routine Repair and Maintenance of Inverter

2.7.1 Routine Repair

The influence of the ambient temperature, humidity, dust and vibration will cause the burning of the devices in the inverter, which may cause potential fault of the inverter or reduce the service life of the inverter. Therefore, it is necessary to carry out daily and periodical maintenance.

Caution
Repair or maintenance cannot be performed right after power-off as there is high voltage on the filter capacitor.

Caution
The repair or maintenance can be conducted only after the charge LED is OFF and the bus voltage is measured to be less than 36V with multimeter.

Routine inspection items include:

1) Whether there is any abnormal change in the running sound of the motor

2) Whether the motor has vibration during the running

3) Whether there is any change to the installation environment of the inverter

4) Whether the inverter cooling fan works normally

5) Whether the inverter has over temperature

Routine cleaning:

The inverter shall be kept clean.

The dust on the surface of the inverter shall be effectively removed, so as to prevent the dust falling into the inverter, especially the metal dust.

The oil stain on the inverter cooling fan shall be effectively removed.

2.7.2 Periodical inspection

Please perform periodic inspection on the places where the inspection is a difficult thing.

Periodic inspection Items include:

1) Check and clean the air duct periodically;

2) Check if the screws are loosened;

3) Check if the inverter is corroded;

4) Check if the wire connector has arc signs;

5) Main circuit insulation test.

Reminder: When using the megameter (DC 500V megameter recommended) to measure the insulating resistance, the main circuit shall be disconnected with the inverter. Do not use the insulating resistance

meter to control the insulation of the circuit. It is not necessary to conduct the high voltage test (which has been completed upon delivery).

2.7.3 Replacement of Vulnerable Parts for Inverter

The vulnerable parts of the inverter include cooling fan and filter electrolytic capacitor, whose life depends on the operating environment and maintenance status. Common service life:

Part name	Life time
Fan	2 to 3 years
Electrolytic capacitor	4 to 5 years

The user can determine the term for replacement according to the running time.

1） Cooling fan

Possible causes for damage: bearing wearing and blade aging.

Criteria: Whether there is crack on the blade and whether there is abnormal vibration noise upon startup.

2） Possible causes for damage of filter electrolytic capacitor: Poor input source quality, high ambient temperature, frequent load jumping and burning electrolyte.

Criteria: Whether there is liquid leakage, whether the safe valve has projected, measure the static capacitance, and measure the insulating resistance.

2.7.4 Storage of Inverter

Attention shall be paid to the following points for the temporary and long-term storage of the inverter:

1) Place the inverter back into the packing box following the original package

2) Long-term storage will degrade the electrolytic capacitor. The product shall be powered up once every 2 years, and the power-up time shall be no less than 5 hours. The input voltage shall be increased slowly to the rated value with the regulator.

2.8 Instructions on Warranty of Inverter

Free warranty only applies to the inverter itself.

1. Our company will provide 18-month warranty (starting from the leave-factory date as indicated on the barcode) for the fault or damage under normal use conditions. If the equipment has been used for over 18 months, reasonable repair expenses will be charged.
2. Reasonable repair expenses will be charged for the following situations within 18 months:

1) The equipment is damaged because the user fails to comply with the requirements of the user's manual;

2) Damage caused by fire, flood and abnormal voltage;

3) Damage caused when the inverter is used for abnormal function.

The service expenses will be calculated according to the standard of the manufacturer. If there is any agreement, the agreement shall prevail.

2.9 Guide to Model Selection

When selecting inverter, firstly make clear the details regarding the technical requirements for variable frequency speed adjustment of the system, applications of inverter and load characteristics and take into overall consideration the adaptable motor, output voltage, rated output and other factors, and then select the model meeting your requirements and determine the running mode.
The basic principle is that the rated load current of the motor cannot exceed the rated current of the inverter. Generally, the model is selected in accordance with the capacity of the supporting motor as specified in the user's manual, with attention to the comparison of rated currents between the motor and the inverter. The overload capacity of the inverter makes sense only for the startup and brake processes. If instantaneous overload occurs in the running process, the load speed will vary. If there are higher requirements for the speed precision, please consider a larger one, or select MD300/320 vector control series.
Fan and pump type: It has lower requirements for the overload capacity. Since the load torque is proportional to the square of the speed, the load is slightly light when it is running at low speed (except Roots fan). Furthermore, this type of load has no special requirements for the precision of the rotation velocity, thus square torque V/F is selected.
Constant torque load: Most loads have constant torque characteristics but low requirements in terms of precision of rotation

2.10 Guide to Selection of Brake Components

It means selection of data. The user can select different resistance and power according to the actual situation (but the resistance shall not be lower than the recommended value in the table, while power can be higher). The selection of brake resistor depends upon the power of the motor in the actual application system and correlates with the system inertia, deceleration time and energy of position load, which shall be performed according to the actual situation.The higher the system inertia is, the shorter the deceleration time required is, while more frequent the brake is, leading to that the brake resistor needs higher power and lower resistance.

2.10.1Selection of Resistance Vlaue

Renewable electric energy consumption is almost the braking resistor when braking.
According to the formula: U*U/R=Pb,
U refers to stable Braking system of Brake voltage. (Different system has different brake voltage. Generally select 700V for the system 380VAC).
Pb represents the Braking power.

2.10.2 Selection of Braking Resistor Power

Theoretically, braking resistor Power is consistent with braking Power.But the derating is 70%.
According to the formula: 0.7*Pr=Pb*D.
Pr refers to the resistor Power.
D refers to braking frequency. (The regeneration process in the proportion of the entire working process).For example, the braking frequency of elevator is between 20%~30%, the winding and unwinding is between 20% ~30%.The centrifuge is between 50%~60%, Occasional brake load is 5%. The General selection is 10%.

Table 2-5 Selection of Inverter Brake Components

Inverter Model	Recommended Power of Brake Resistor	Recommended Resistance of Brake Resistor	Brake Unit	Rmarks
MD280S0.4G	80W	≥200Ω	Built-in as standard	
MD280S0.7G	80W	≥150Ω		
MD280S1.5G	100W	≥100Ω		
MD280S2.2G	100W	≥70Ω		
MD280T0.7G	150W	≥300Ω		
MD280T1.5G	150W	≥220Ω		
MD280T2.2G	250W	≥200Ω		
MD280T3.7G/5.5P	400W	≥90Ω		
MD280T5.5G/7.5P	500W	≥65Ω		
MD280T7.5G/11P	800W	≥43Ω		
MD280T11G/15P	1000W	≥32Ω		
MD280T15G/18.5P	1300W	≥25Ω		
MD280T18.5G/22P	1500W	≥22Ω	Built-in as optional	
MD280T22G/30P	2500W	≥16Ω		
MD280T30G/37P	2500W	≥16Ω		
MD280T37G/45P	3.7 kW	≥16.0Ω	Externally connected	MDBU-35-B
MD280T45G/55P	4.5 kW	≥16Ω	Externally connected	MDBU-35-B
MD280T55G/75P	5.5 kW	≥8Ω	Externally connected	MDBU-70-B
MD280T75G/90P	7.5 kW	≥8Ω	Externally connected	MDBU-70-B
MD280T90G/110P	4.5 kW×2	≥8Ω×2	Externally connected	MDBU-70-B×2
MD280T110G/132P	5.5 kW×2	≥8Ω×2	Externally connected	MDBU-70-B×2
MD280T132G/160P	6.5 kW×2	≥8Ω×2	Externally connected	MDBU-70-B×2
MD280T160G/200P	16kW	≥2.5Ω	Externally connected	MDBU-210-B
MD280T200G/220P	20 kW	≥2.5Ω	Externally connected	MDBU-210-B

Inverter Model	Recommended Power of Brake Resistor	Recommended Resistance of Brake Resistor	Brake Unit	Rmarks
MD280T220G/250P	22 kW	≥2.5Ω	Externally connected	MDBU-210-B
MD280T250G/280P	12.5 kW×2	≥2.5Ω×2	Externally connected	MDBU-210-B×2
MD280T280G/315P	14kW×2	≥2.5Ω×2	Externally connected	MDBU-210-B×2
MD280T315G/355P	16kW×2	≥2.5Ω×2	Externally connected	MDBU-210-B×2
MD280T355G/400P	17kW×2	≥2.5Ω×2	Externally connected	MDBU-210-B×2
MD280T400G/450P	14 kW×3	≥2.5Ω×3	Externally connected	MDBU-210-B×3

Caution: ×2 refers to two braking units paralleled with their respective brake resistor; the meaning of ×3 is the same with ×2.

3

Mechanical and Electrical Installation

Chapter 3 Mechanical and Electrical Installation

3.1 Mechanical Installation

3.1.1 Installation environment:

1) Ambient temperature: The ambient temperature exerts great influences on the service life of the inverter and is not allowed to exceed the allowable temperature range (-10 ℃ Celsius to 50 ℃ Celsius).

2) The inverter shall be mounted on the surface of incombustible articles, with sufficient spaces nearby for heat sinking. The inverter is easy to generate large amount of heat during the operation. The inverter shall be mounted vertically on the base with screws.

3) The inverter shall be mounted in the place without vibration or with vibration of less than 0.6G, and shall be kept away from such equipment as punching machine.

4) The inverter shall be mounted in locations free from direct sunlight, high humidity and condensate.

5) The inverter shall be mounted in locations free from corrosive gas, explosive gas or combustible gas.

6) The inverter shall be mounted in locations free from oil dirt, dust, and metal powder.

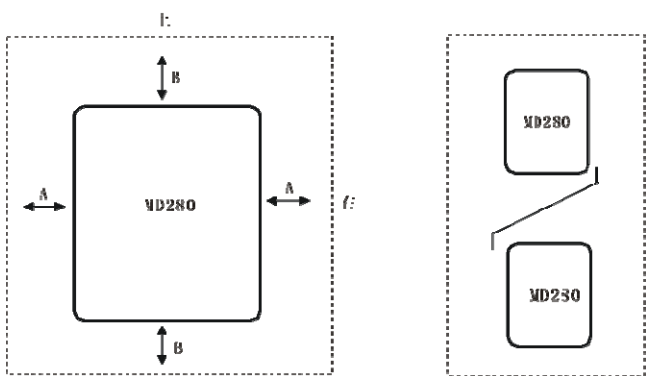


Fig.3-1MD280 Inverter Installation Diagram

Installation Diagram of Upper and Down Parts

Caution: When the inverter power is not higher than 22kW, the A size can be omitted. When the inverter power is higher than 22kW, the A size shall be higher than 50mm.

Caution: When performing up-down installation of inverter, please install the thermal insulating guide plate as shown in the diagram.

Table.3-1 Schematic Diagram for Installation of MD280 Inverter

Power Level	Mounting Dimension	
	B	A
≤15kW	≥100mm	No requirements
18.5kW—30kW	≥200mm	≥50mm
≥37kW	≥300mm	≥50mm

Caution: When the inverter power is no more than 18.5G/22P, dimension A can be neglected. When the inverter power is higher than 18.5G/22P, dimension A shall be higher than 50mm.

Caution: When performing up-down installation of inverter, please install the thermal insulating guide plate as shown in the diagram.

Heat sinking shall be taken into account during the installation. Attention shall be paid to the following items:

1) Install the inverter vertically so that the heat may be expelled from the top.However, the equipment cannot be installed upside down. If there are multiple inverters in the cabinet, parallel installation is better. In the applications where up-down installation is required, please install the thermal insulating guide plate referring to the schematic diagrams for standalone installation and up-down installation.

2) The mounting space shall be as indicated as the above diagrams, so as to ensure the heat sinking space of the inverter. However, the heat sinking of other devices in the cabinet shall also be considered.

3) The installation bracket must be made of flame retardant materials.

4) In the applications where there are metal powders, it is recommended to install the radiator outside the cabinet. In this case, the

space inside the sealed cabinet shall be large as much as possible.

Lower cover removable and installation: MD280 series inverter of below 15G/18.5P employs the plastic enclosure. Refer to Fig.3-2 for the removal of the lower cover of the plastic enclosure. Push out the hook inside of the lower cover with tools.

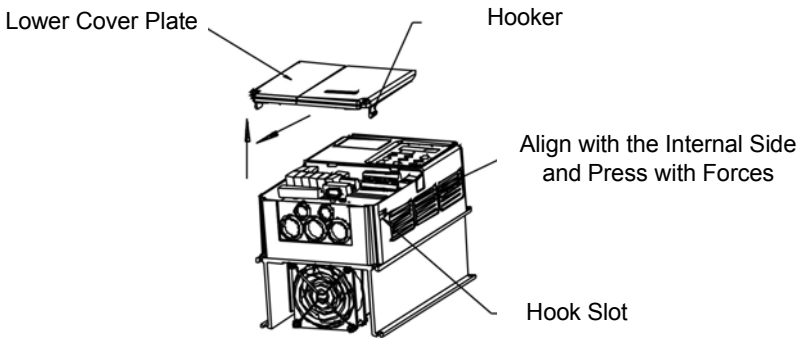


Fig.3-2 Removal of Lower Cover of the Plastic Enclosure

MD series inverters of above 18.5G/22P employ sheet-metal enclosures. Refer to Fig.3-3 for the removal of the upper cover of the sheet-metal enclosure. Loosen the screws of the upper cover directly with tools.

Danger
When removing the lower cover, avoid the falling of the lower cover, which may cause human injury or damage to the equipment.

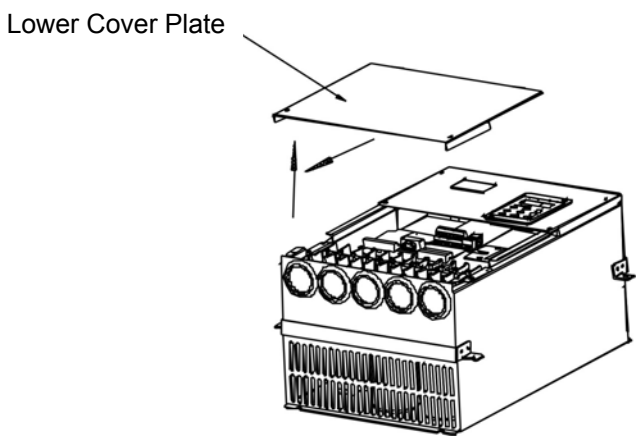


Fig.3-3 Removal of Lower Cover of the Sheet-Metal Enclosure

3.2 Electrical Installation

3.2.1 Guide to the Selection of Peripheral Electrical Parts

Table 3-1 Guide to the Selection of Peripheral Electrical Parts of MD280 Inverter

Inverter Model	Circuit Breaker (MCCB) (A)	Recommended Contactor (A)	Recommended Input Side Main Circuit Wire (mm^2)	Recommended Output Side Main Circuit Wire (mm^2)	Recommended Control Circuit Wire (mm^2)
MD280S0.4G	16	10	2.5	2.5	1.5
MD280S0.7G	16	10	2.5	2.5	1.5
MD280S1.5G	20	16	4	2.5	1.5
MD280S2.2G	32	20	6	4	1.5
MD280T0.7G	10	10	2.5	2.5	1.5
MD280T1.5G	16	10	2.5	2.5	1.5
MD280T2.2G	16	10	2.5	2.5	1.5
MD280T3.7G	25	16	4	4	1.5
MD280T3.7G/5.5P	32	25	4	4	1.5
MD280T5.5G/7.5P	40	32	4	4	1.5
MD280T7.5G/11P	63	40	4	4	1.5
MD280T11G/15P	63	40	6	6	1.5
MD280T15G/18.5P	100	63	6	6	1.5
MD280T18.5G/22P	100	63	10	10	1.5
MD280T22G/30P	125	100	16	10	1.5
MD280T30G/37P	160	100	16	16	1.5
MD280T37G/45P	200	125	25	25	1.5
MD280T45G/55P	200	125	35	25	1.5
MD280T55G/75P	250	160	50	35	1.5
MD280T75G/90P	250	160	70	35	1.5
MD280T90G/110P	350	350	120	120	1.5

Inverter Model	Circuit Breaker (MCCB) (A)	Recommended Contactor (A)	Recommended Input Side Main Circuit Wire (mm^2)	Recommended Output Side Main Circuit Wire (mm^2)	Recommended Control Circuit Wire (mm^2)
MD280T110G/132P	400	400	150	150	1.5
MD280T132G/160P	500	400	185	185	1.5
MD280T160G/200P	600	600	150*2	150*2	1.5
MD280T200G/220P	600	600	150*2	150*2	1.5
MD280T220G/250P	800	600	185*2	185*2	1.5
MD280T250G/280P	800	800	185*2	185*2	1.5
MD280T280G/315P	800	800	150*3	150*3	1.5
MD280T315G/355P	800	800	150*4	150*4	1.5
MD280T355G/400P	1000	1000	150*4	150*4	1.5
MD280T400G/450P	1000	1000	150*4	150*4	1.5

3.2.2 Use instruction of peripheral electric parts:

Table 3-2 Guide to the Use Instruction of Peripheral Electric Parts of MD280 Inverter

Part Name	Installation Location	Function Description
Circuit breaker	The front-end of the input circuit	Disconnect the power supply in case of downstream equipment is over current.
Contactor	Between the circuit breaker and the inverter input side	Power-on and power-off of the inverter.Frequent power-on/power-off operation on the inverter shall be avoided.
AC input reactor	Input side of the inverter	1） Improve the power factor of the input side. 2） Eliminate the high order harmonics of the input side effectively, and prevent other equipment from damaging due to voltage waveform deformation. 3） Eliminate the input current unbalance due to the

Part Name	Installation Location	Function Description
		unbalanced power phases.
EMC input filter	Input side of the inverter	1） Reduce the external conduction and radiation interference of the inverter; 2） Reduce the conduction interference flowing from the power end to the inverter, thus improving the anti-interference capacity of the inverter.
DC reactor	MD280 series inverter of above 7.5G/11P adopts DC reactor as standard	1） Improve the power factor of the input side; 2） Improve the overall efficiency and thermal stability of the inverter. 3） 3) Effectively reduce the influence of high order harmonics at the input side on the inverter and reduce the external conduction and radiation interference.
AC output reactor	Between the inverter output side and the motor, close to the inverter	The inverter output side generally has higher harmonic.When the motor is far from the inverter, since there are many capacitors in the circuit, certain harmonics will cause resonance in the circuit and bring in the following results: 1） Degrade the motor insulation performance and damage the motor for the long run 2） Generate large leakage current and cause frequent inverter protection action 3） In general, if the distance between the inverter and the motor exceeds 100 meters, output AC reactor shall be installed.

3.2.3 Wiring mode

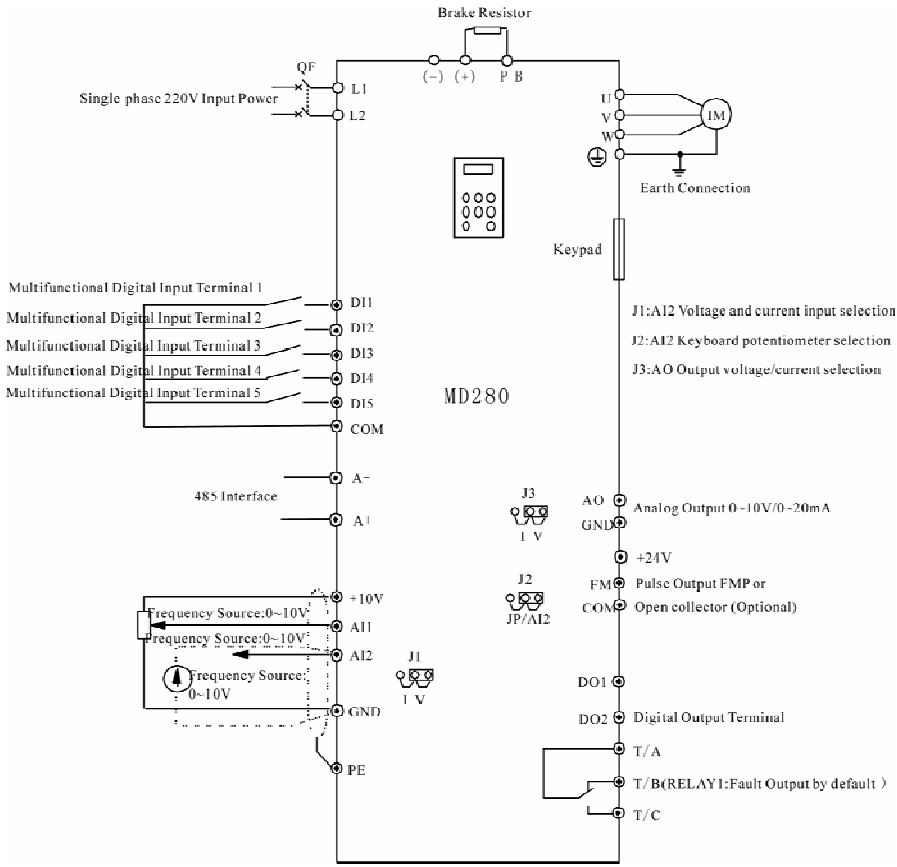


Fig.3-4 Schematic Diagram for the Wiring Connection of Single-Phase Inverters of MD280S0.4G/MD280S0.7G/MD280S1.5G/MD280S2.2G

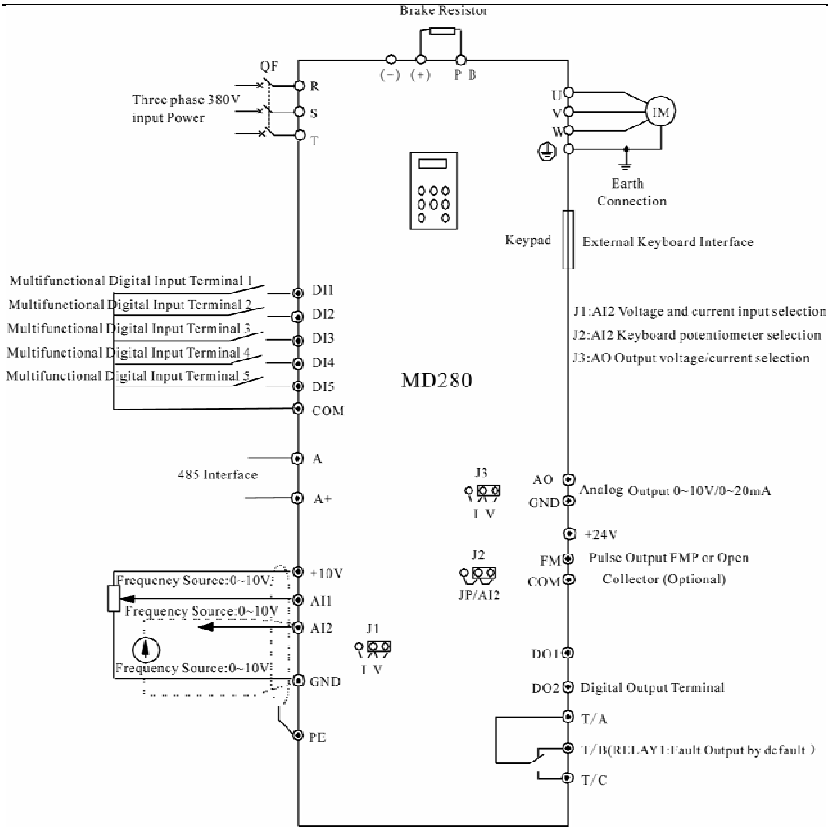


Fig.3-5 Schematic Diagram for the Wiring Connection of Three-Phase Inverters of 3MD280T0.7G to MD280T30G/37P

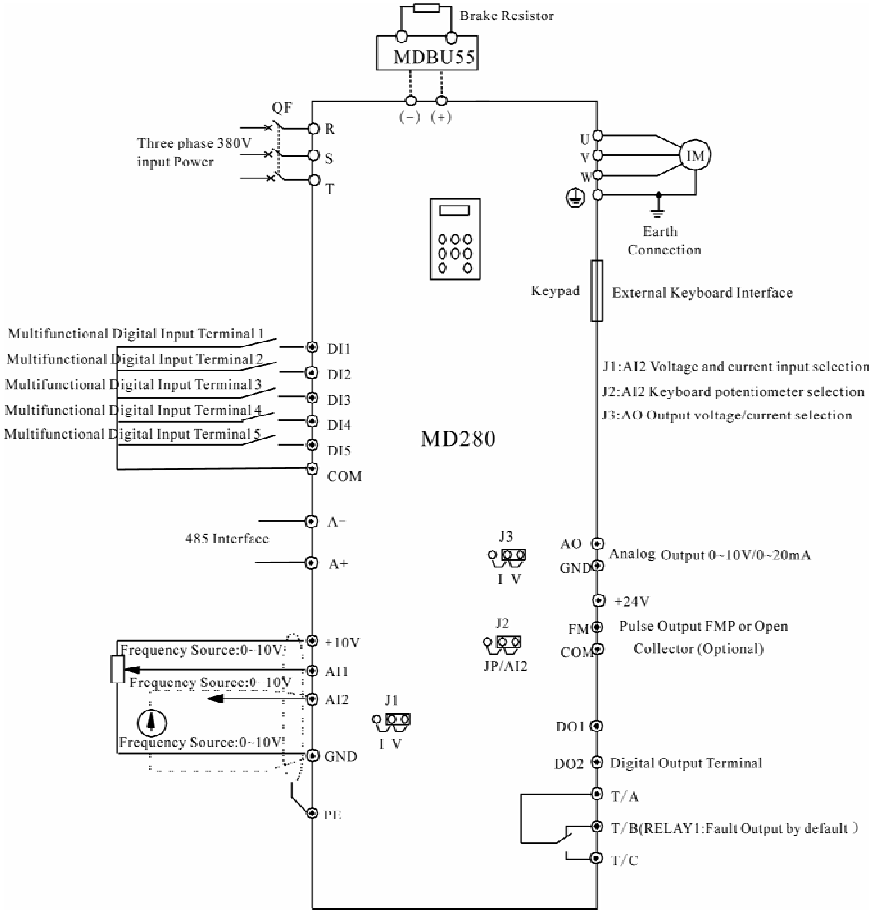


Fig.3-6 Schematic Diagram for the Wiring Connection of Three-Phase Inverters of MD280T37G/45P to MD280T55G/75P

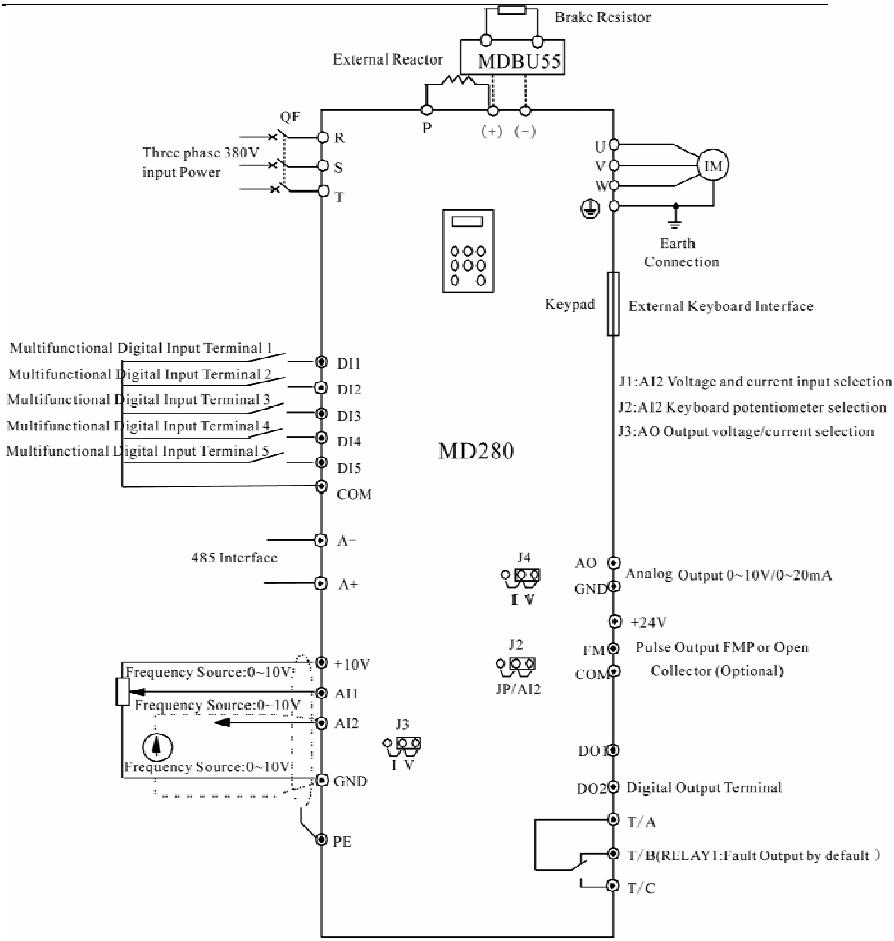


Fig.3-6 Schematic Diagram for the Wiring Connection of Three-Phase Inverters of MD280T75G/90P to MD280T400G/450P

3.2.4 Main Circuit Terminals and Wiring

Danger

- Make sure that the wiring operation shall be carried out only when the power supply switch is in OFF position, or there may be risk of electric shock.
- Only the professional technicians who have received training can perform wiring, or it may cause injuries to the equipment and human body.
- It shall be grounded reliably, or there may be risk of electric shock or fire acciden.

Caution

- Make sure that the input power supply and the rated value of the inverter shall be consistent, or it may damage the inverter.
- Make sure that the motor is compatible with the inverter, or the motor may be damaged or inverter protection may be caused.
- Do not connect the power supply to the U, V, W terminals, or it may damage the inverter.
- Do not connect the brake resistor to the DC bus terminals (+) and (-) directly, or there may be fire accident.

1） Description of main circuit terminals of single-phase inverter:

Terminals	Name	Description
L1、L2	Single-phase power input terminal	Connect to the AC single-phase 220V power supply
(+)、(-)	Negative and positive terminals of DC bus	Shared DC bus input point
(+)、PB	Connecting terminal of braking resistor	Connect to the braking resistor
U、V、W	Output terminal of inverter	Connect to the three-phase motor
⏚	Grounding terminal	Grounding terminal

2） Description of main circuit terminals of three-phase inverter:

Terminals	Name	Description

Terminals	Name	Description
R、S、T	Three-phase power input terminal	Connect to the AC three-phase 380V power supply
(+)、(-)	Negative and positive terminals of DC bus	Shared DC bus intput point (Connect to the external brake unit above 37G/45P)
(+)、PB	Connecting terminal for brake resistor	Connection points for the brake unit of of below 37G/45P
P、(+)	Connecting terminal for external reactor	Connect to the external reactor
U、V、W	Output terminal of inverter	Connect to three-phase motor
⏚	Grounding terminal	Grounding terminal

1） Wiring Precautions

a） Input power supply terminals L1, L2, R, S or T:

There is no sequence requirement for the wiring at the Input side of the inverter.

b） DC bus (+) and (-) terminals:

The DC bus (+) and (-) terminals still have residual voltage at the time of power-off. Do not touch the equipment until the charge LED is OFF and the voltage measured with multimeter is less than 36V.

When selecting external brake components for the inverter of above 45kW, note that the connecting polarity must be correct, or the inverter may be damaged and even fire accident may occur.

The wire length of the brake unit shall not be longer than 10 meters. Twisted wires or pair wires shall be used and connected in parallel.

Do not connect the braking resistor directly to the DC bus, otherwise, the inverter may be damaged, and fire may be caused.

c） Connecting terminals (+) and PB of brake resistor

The connecting terminals of the brake resistor are enabled only for the inverter of below 37G/45P with built-in brake unit.

The recommended wiring distance for the brake resistor shall be less than 5m. Otherwise, the inverter may be damaged.

d） Connecting terminals P and (+) of external reactor

When assembling the inverter of above 75G/90P with external reactor, it needs to remove the connector between terminals of P and (+) and connect the reactor between them instead.

e） Inverter output sides U, V and W:

The inverter output side cannot connect to the capacitor or surge absorber, otherwise, the frequent inverter protection may be caus ed, or the inverter may be damaged.

If the wire between the motor and the inverter is too long, electrical resonance may be caused due to the influence of the distributed capacitance, thus damaging the motor insulation or produce large leakage current to trigger inverter over current protection. When the length of the motor cable is longer than 100 meters, AC output reactor shall be installed.

f） Grounding terminal ⏚PE:

The terminal must be grounded reliably, and the resistance of the ground wire must be less than 0.1Ω. Otherwise, fault may be caused, or the inverter may be damaged.

Do not share the grounding terminal ⏚ and terminal N of zero line of the power supply.

3.2.5 Control Terminals and Wiring

1）The terminals of the control circuit are arranged as shown in the following diagram:

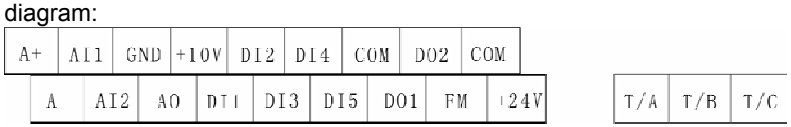


Fig.3-8 Terminal Layout of the Control Circuit

2）Function Description of Control Terminal

Table 3-3 Function Description of MD280 Inverter Control Terminal

Type	Terminal	Terminal Name	Function Description
Power supply	+10V-GND	External terminal of 10V power supply	Provide +10V power supply for external units, with maximum output current of 10mA. It is generally used as the operating power supply for the external potentiometer. The potentiometer resistance range is 1kΩ to 5kΩ.
	+24V-COM	External terminal of 24V power supply	Provide +24V power supply for external units. It is generally used as the operating power supply for digital input/output terminal and the external sensor. Maximum output current: 200mA
Analog input	AI1-GND	Analog input terminal 1	1. Input voltage range: DC 0V to 10V (can be customized as non-standard -10VDC to +10VDC) 2. Input impedance: 20kΩ
	AI2-GND	Analog input terminal 2	1. Input voltage range: DC 0V to 10V (can be customized as non-standard -10VDC to +10VDC)/0mA to 20mA, the selection of which depends on jumper J1 on the control panel. 2. Input impedance: 20kΩ at the time of voltage input; 500Ω at the time of current input. 3. Keyboard potentiometer input: It can switch between AI2 and external keyboard potentiometer via Jumper J2.
Digital Input	DI1-COM	1Digital Input 1	1. Optical coupling isolation. 2. Input impedance: 3.3kΩ
	DI2-COM	Digital Input 2	
	DI3-COM	Digital Input 3	
	DI4-COM	Digital Input4	
	DI5-COM	High-speed pulse input terminal	In addition to the characteristics of DI1 to DI4, it can also be used as the high-speed pulse input channel. Maximum input frequency: 50kHz.

Type	Terminal	Terminal Name	Function Description
Analog output	AO-GND	Analog Output 1	The voltage or current output is determined by jumper J3 on the control panel. Output voltage range: 0V to 10V Output current range: 0mA to 20mA.

Type	Terminal	Terminal name	Function description
Digital Output	DO1-COM DO2-COM	Digital output	Optical coupling isolation,dual polarity open collector output Output voltage range: 0V to 24V Output current range: 0mA to 50mA
	FM-COM	High-speed pulse output	When it is used as high-speed pulse output，the maximum frequency can reach 50kHz; When it is used as open collector output, it is the same as DO1 in terms of specification. Caution:The function of AO，FM，DO3 share the channel,only one of which can be selected.
Relay output	T/A-T/B	Normally closed terminal	Contact driving capacity: AC250V,3A,COSφ=0.4。 DC 30V，1A
	T/A-T/C	Normally open terminal	
Auxiliary interface	A+/A-	485 communication port	Standard 485 interface
	Keypad	External keyboard interface	Standard RJ45 network cable interface, used to provide signals for the external keyboard.

3) Description of wiring of control terminals:

A. Analog input terminal:

Because the weak analog signal will be easily affected by the external interference, generally shielded cable shall be used, and the cable length shall be as short as possible and no longer than 20 meters, as shown in Fig.3-9, In case the analog signal is subject to severe interference,

and analog signal source side shall be installed with filter capacitor or ferrite magnetic core, as shown in Fig.3-10.

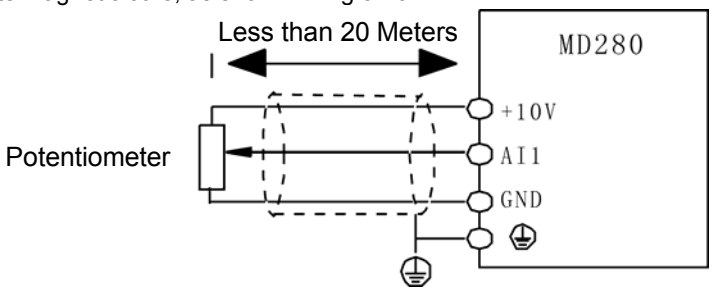


Fig.3-7 Schematic diagram for Wiring of Analog Input Terminal

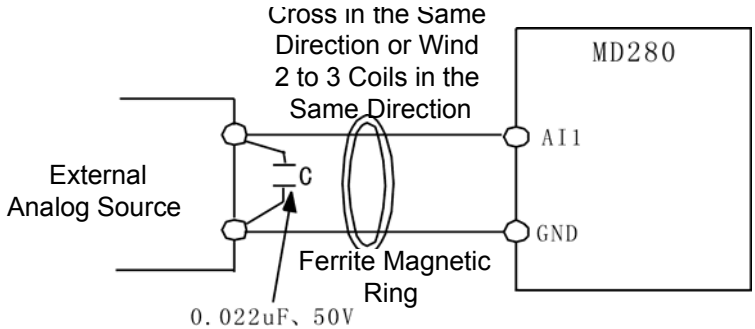


Fig.3-8 Schematic Diagram for Wiring of Analog Input Terminal

B. Digital input terminal:

It needs to employ shielded cable generally, with wiring distance of no longer than 20 meters.

When valid driving is adopted, necessary filtering measures shall be taken to prevent the interference to the power supply.

It is recommended to use the contact control mode.

B. Digital output terminal:

When connecting to the load, the digital output terminal is directly connected between D0 and 24V, and there already exists continuous-flow absorption circuit inside the inverter. The load current is less than 50mA.If the load is too high, please transit via the replay.

4

Operation and Display

Chapter 4 Operation and Display

4.1 Introduction to Operation and Display Interface

Modification of function parameter, monitoring of inverter operation, control of inverter operation (start and stop) can be performed through the operation panel.

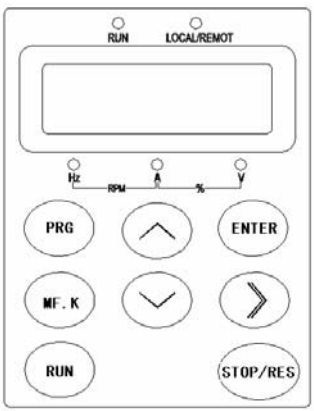


Fig.4-1 Schematic Diagram for the External Operation Panel of Inverter without Potentiometer

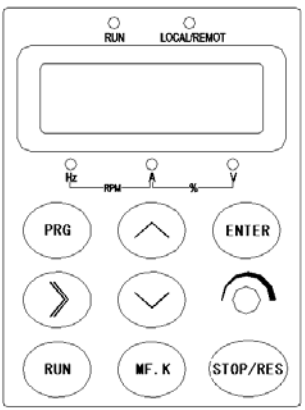


Fig.4-2 Schematic Diagram for the External Keyboard of Inverter with Potentiometer

1) Function LED Indictor Description:

RUN: When it is OFF, it indicates that the inverter is in stop status. When it is ON, it indicates that the inverter is in running status.

LOCAL/REMOT: The LED indicator for keypad operation, terminal operation and remote operation; when it is OFF, it is under keypad operation control; when it is ON, it is under terminal operation control; when it flashes, it is under communication operation control.

2) Unit LED indictor description:

Hz refers to unit of frequency

A refers to unit of current

V refers to unit of voltage

RMP (Hz + A) refers to unit of rotation velocity

% (A + V) refers to percentage

3）Data display region

Five-digit LED display, able to display setup frequency, output frequency, various monitor data and alarm code.

4）Keyboard button description:

Table 4-1 Keyboard Function Table

Button	Name	Function
PRG	Programming key	Enter or exit from first-level menu.
ENTER	Confirmation key	Increase of the data or function code.
∧	Increase key	Increase of the data or function code
∨	Decrease key	Decrease of the data or function code
》	Shift key	On the stop display interface or running display interface, it can be used to circularly select the display parameters. When modifying the parameters, it can be used to select the bits of parameter for modification.
RUN	Running key	It is used to start the running of the inverter under keyboard control mode.
STOP/RES	Stop/reset	In running status, it can stop the running by pressing this key. In alarm status, it can reset operation with this key. The characteristics of this key are limited by function code F7-17.
MF.K	Multi-function selection key	It is used as function switching selection according to F-15.

4.2 Description of Function Code Viewing and Modification Method

The operation panel of MD280 inverter adopts three-level menu structure to perform parameter setting.

The three-level menu includes: function parameter group (level 1 menu) → function code (level 2 menu) → setting value of function code (level 3 menu).The operation process is as shown in Fig.4-3

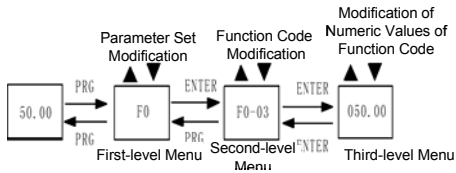


Fig.4-3 Operation Process of Three-Level Menu

Caution: When operating on level 3 menu, press PRG key or ENTER key to return to level-2 menu. The difference between ENTER and PRG keys is that pressing ENTER KEY will save the setup parameter and return to level 2 menu and then automatically shift to the next function code, while pressing PRG key will directly return to level 2 menu without saving the parameter, and it will return to the current function code.

Take the modification of function code F0-05 from 10.00Hz to 15.00Hz as an example. (The boldface bit indicates the flashing bit)

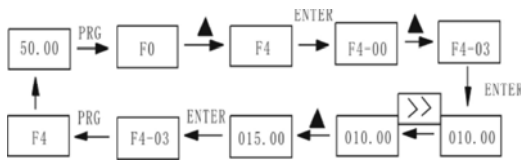


Fig.4-4 Example of Parameter Editing Operation

In level 3 menu, if the parameter has no flashing bit, it indicates that the function code cannot be modified. The possible reasons include:

1) The function code is an unchangeable parameter, such as Such as actual detection parameter, running record parameter, etc.

2) The function code cannot be modified in running status but can be modified after the unit is stopped.

4.3 Viewing Method of Status Parameter

When the inverter is in stop or running status, multiple status parameters can be displayed. It can select whether this parameter is to be displayed in binary bit with the function codes F7-13 (running parameter) and F7-14 (stop parameter). Refer to the descriptions of F7-13 and F7-14 in Chapter 6 for the meanings of each bit.

In stop status, a total of 8 stop status parameters can be selected to display or not to display, including setup frequency, bus voltage, DI input status, DO output status, analog input AI 1 voltage, analog input AI2 voltage, actual counting value, actual length value, the display of which can be switched by pressing “》”key.

In running status, there are a total of 16 running status parameters, including setup frequency, output voltage, output current, output power, DI input status, DO output status, analog input AI1 voltage, analog input AI2 voltage, actual counting value, actual length value, PID setup, PID feedback, pulse input frequency, the display of which can be switched by pressing "》"key.

4.4 Password Setting

The inverter provides user password protection function. When FP-00 is set to non- zero value, it is user password and enabled after exiting the function code editing status. When the user presses the PRG key again, "-----"will be displayed to require the user to enter user password, or the user cannot enter the general menu.

To cancel the password protection function, the user needs to enter the relevant interface through password, and change the FP-00 setting to 0.

5

Function Parameter Table

Chapter 5 Function Parameter Table

When FP-00 is set to non-zero value, it means that the parameter protection password is set and only when correct password is input can the user enter the parameter menu. To cancel the password, it needs to set FP-00 to 0.

The parameters in the shortcut menu are out of password protection.

The symbols in the function table are explained as follows:

"☆" indicates that the parameter setup value can be modified when the inverter is in stop status and running status;

"★" indicates that the parameter setup value cannot be modified when the inverter is in the running status;

"●" indicates that the parameter value is the actual detection record and cannot be modified.

"*" indicates that the parameter is "Factory default parameter" and can be set only by the manufacturer, and the user is forbidden to perform any operation.

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
Group F0 Basic function group					
F0-00	Command source selection	0: Operation panel control channel (LED ON) 1: Terminal command channel (LED OFF) 2. Serial port communication control channel (LED FLASHING)	1	0	☆
F0-01	Frequency source selection	0: Digital setting (UP and Down adjustment) 1: AI1 2: AI2 3: PULSE setting (DI5) 4: MS speed 5：PLC 6：PID 7：AI1+AI2 8：Communication setup 9：PID + AI1 10：PID + AI2	1	0	★
F0-02	Digital setup frequency memory selection	0:Without memory 1:Power fault memory 2:Stop memory 3:Stop and power fault memories	1	0	☆
F0-03	Pre-set frequency	0.00Hz to maximum frequency (F0-04)	0.01Hz	50.00Hz	☆
F0-04	Maximum	50.00Hz to 630.00Hz	0.01Hz	50.00Hz	★

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	frequency				
F0-05	Frequency source upper limit	0:Numerical value setting (F0-06) 1：AI1 2：AI2 3：PULSE setting (DI5)	1	0	★
F0-06	Frequency upper limit setup	0.00Hz to maximum frequency (F0-04)	0.01Hz	50.00Hz	☆
F0-07	Frequency upper limit setup	0.00Hz to frequency upper limit （F0-06）	0.01Hz	0.00Hz	☆
F0-08	Speed-up/speed-down time unit	0: s (second) 1: m (minute)	1	0	★
F0-09	Speed-up time 1	0.00s(m) to 300.00s(m)	0.01s(m)	Model dependent	☆
F0-10	Speed-down time 1	0.00s(m) to 300.00s(m)	0.01s(m)	Model dependent	☆
F0-11	Carrier frequency	0.5kHz to 16.0kHz	0.1kHz	Model dependent	☆
F0-12	Running direction	0: Consistent direction 1: Reverse direction	1	0	☆
F0-13	Referen	0： Maximum frequency	1	0	★

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	ce frequency of speed-up/speed-down time	1： Setup value			
F0-14	Running frequency UP/DOWN reference	0: Running frequency 1:Setup frequency	1	0	☆
F0-15	Auxiliary Frequency source Y selection	0：Digital setup（UP or DOWN can be modofied） 1：AI1 2：AI2 3：PULSE setting（DI5） 4：MS speed 5：PLC 6：PID 7：AI1+AI2 8：Communication setup	1	0	★
F0-16	Auxiliary frequency source Y selection at the time of overlap	0：Relative to maximum frequency 1：Relative to frequency source X	1	0	☆
F0-17	Auxiliary	0% to 150%	1%	100%	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	frequency source Y selection at the time of overlap				
F0-18	Frequency source Y selection	0：Main 1：Main + auxiliary 2：Main←>Auxiliary 3：Main←> Main + auxiliary 4：Auxiliary←>Main + auxiliary	1	0	☆
F0-20	Auxiliary frequency source digital setup offset	0.00Hz to Maximum frequency F0-04	0.01Hz	0.00Hz	☆
Group F1 Motor Parameters and V/F Control Parameters					
F1-00	Motor rated power	0.2kW to 1000.0kW	0.1kw	Model dependent	★
F1-01	Motor rated voltage	0V to 480V	1V	Model dependent	★
F1-02	Motor rated current	0.1A to 6553.5A	0.1A	Model dependent	★
F1-03	Motor rated frequency	0.01Hz to maximu frequency （F0-04）	0.01Hz	Model dependent	★

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
F1-04	V/F curve setup	0: Linear V/F curve 1:Multiple-point V/Fcurve 2:Square V/F curve	1	0	★
F1-05	Torque hoist	0.0%（auto） 0.1% to 30.0%	0.1%	Model dependent	☆
F1-06	Torque boost cutoff frequency	0.00Hz to maximu frequency（F0-04）	0.01Hz	50.00Hz	★
F1-07	Multi-point V/F frequency point f1	0.00Hz to F1-09	0.01Hz	0.00Hz	★
F1-08	Multi-point V/F frequency point v1	0.0% to 100.0%	0.1%	0.0%	★
F1-09	Multi-point V/F frequency point f2	F1-07 to F1-11	0.01Hz	0.00Hz	★
F1-10	Multi-point V/F voltage point v2	0.0% to 100.0%	0.1%	0.0%	★
F1-11	Multi-point V/F	F1-09 to Motor rated frequency (F1-03)	0.01Hz	0.00Hz	★

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	frequency point f3				
F1-12	Multi-point V/F voltage point v3	0.0% to 100.0%	0.1%	0.0%	★
F1-13	Slip compensation coefficient	0.0% to 200.0%	0.1%	0.0%	☆
F1-14	Over excitation gain	0 to 200	1	64	☆
F1-15	No-load current	0.1A to motor rated current （F1-02）	0.1A	Model dependent	☆
F1-16	Stator resistance	0.001Ω to 65.535Ω	0.001Ω	Model dependent	☆
F1-17	Oscillation suppression gain	0 to 100	1	Model dependent	☆
F1-18	Tuning selection	0：No operation 1：Tuning	1	0	★
F1-19	Oscillation suppression mode	0 to 3	1	1	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
Group F2 Input terminal					
F2-00	DI1 terminal function selection	0: None 1: Run forward (FWD) 2:RUN reverse (REV) 3: Three-line running control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6. Terminal UP 7. Terminal DOWN 8: Free stop 9: Fault reset (RESET) 10.Pause during the operation 11: External fault input normally open 12: External fault input normally closed 13. MS speed terminal 1 14. MS speed terminal 2 15. MS speed terminal 3 16:Speed-up/speed-down time selection terminal 17: UP/DOWN setup clearing 18:Stop DC brake terminal 19:Speed-up/speed-down disabled 20. PID pause 21: PLC status reset 22:Swing frequency pause 23: Counter input (DI5) 24: Counter reset	1	1	★
F2-01	DI2 terminal function selection		1	2	★
F2-02	DI3 terminal function selection		1	4	★
F2-03	DI4 terminal function selection		1	8	★
F2-04	DI5 terminal function selection		1	0	★

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
		25:Length counting input (DI5) 26:Length counting reset 27:Interchange of AI1 and AI2 settings 28: Switch the frequency source to AI1，it is enabled only set F0-18(frequency + selection)to 0. 29:DC brake at stop enabled 30:Keyboard command source switching 31:Terminal command source switching 32:Switch between the first motor and the second motor			
F2-05	DI filtering time	1 to 10	1	4	☆
F2-06	Terminal command mode	0: two-line mode 1 1: two-line mode 2 2: three-line mode1 3: three-line mode2	1	0	★
F2-07	Terminal UP/DOWN velocity	0.01Hz/s to 100.00Hz/s	0.01Hz/s	1.00Hz/s	☆
F2-08	AI1 minimum input	0.00V to F2-10	0.01V	0.02V	☆
F2-09	Corresp	-100.0% to 100.0%	0.1%	0.0%	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	onding Setup of AI minimum input				
F2-10	AI1 maximum input	F2-08 to 10.00V	0.01V	10.00V	☆
F2-11	AI1 maximum input corresponding setup	0: F2-12 1: Set by AI2	1	0	★
F2-12	AI1 maximum input corresponding setup	-100.0% to 100.0%	0.1%	100.0%	☆
F2-13	AI1 input filtering time	0.00s to 10.00s	0.01s	0.10s	☆
F2-14	Minimum input	0.00V to F2-16	0.01V	0.02V	☆
F2-15	AI2 minimum input corresponding setup	-100.0% to 100.0%	0.1%	0.0%	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
F2-16	AI2 maximum input	F2-14 to 10.00V	0.01V	10.00V	☆
F2-17	AI2 maximum input corresponding setup mode	0: F2-18 1: Set by AI1	1	0	★
F2-18	AI2 maximum input corresponding setup	-100.0% to 100.0%	0.1%	100.0%	☆
F2-19	AI2 input filtering time	0.00s to 10.00s	0.01s	0.10s	☆
F2-20	PULSE input minimum frequency	0.00kHz to F2-22	0.01kHz	0.00kHz	☆
F2-21	PULSE input minimum frequency correspo	-100.0% to 100.0%	0.1%	0.0%	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	nding setup				
F2-22	PULSE input maximum frequency	F2-20 to 50.00kHz	0.01kHz	50.00kHz	☆
F2-23	PULSE input maximum frequency corresponding setup	0: F2-24 1: Set by AI1 2: Set by AI2	1	0	★
F2-24	PULSE input maximum frequency corresponding setup	-100.0% to 100.0%	0.1%	100.0%	☆
F2-25	PULSE input filtering time	0.00s to 10.00s	0.01s	0.10s	☆
F2-26	DI input terminal	0 to 31	1	0	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	valid status selection				
F2-27	AI1 as function selection of DI6	同F2-00	1	0	★
F2-28	AI2 as the function selection of DI7	同F2-00	1	0	★
Group F3 Output terminal					
F3-00	Multifunctional terminal output selection	0: FM (FMP pulse output) 1：FM (DO3 digital output) 2: AO (Analog output)	1	2	☆
F3-01	RELAY output selection	0: No output 1: Inverter being running 2: Fault output 3:Frequency level detection FDT arrival 4：Frequency arrival 5：Frequency upper limit arrival 6： Frequency lower limit arrival 7:In zero speed operation 8: Motor overload alarm 9: Inverter overload alarm 10: Setup counting value arrival	1	2	☆
F3-02	DO1 output selection		1	1	☆
F3-03	DO2 output selection		1	4	☆
F3-04	FM (DO3) output selection		1	0	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
		11: Designated counting arrival 12:Length arrival 13: PLC circulation end 14: Run time arrival 15: Communication control 16: RUN ready 17: AI1>AI2 18:Zero-current is detected			
F3-05	FMP and AO output selection	0: Running frequency 1: Setup frequency 2: Output current 3: Output power 4: PULSE input 5: AI1 6: AI2 7:Length value 8:Counting value 9:Communication control output	1	0	☆
F3-06	AO zero offset coefficient	-100.0% to 100.0%	0.1s	0.0%	☆
F3-07	AO gain	-10.00 to 10.00	0.01	1.00	☆
F3-08	Maximum frequency of FMP output	0.1kHz to 50.0kHz	0.1kHz	50.0kHz	☆
F3-09	RELAY output	0.0s to 3600.0s	0.1s	0.0s	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	delay time				
F3-10	DO1 output delay time	0.0s to 3600.0s	0.1s	0.0s	☆
F3-11	DO2 output delay time	0.0s to 3600.0s	0.1s	0.0s	☆
F3-12	DO3 output delay time	0.0s to 3600.0s	0.1s	0.0s	☆
F3-13	DO output terminal valid status selection	0 to 15	1	0	☆
Group F4 Start/Stop Control					
F4-00	Startup mode	0: Direct startup 1:Rotation velocity tracking startup	1	0	★
F4-01	Rotation speed tracking mode	0:Start from stop frequency 1: Start from zero speed 2: Start from maximum frequency	1	0	☆
F4-02	Rotation speed tracking fastness	1 to 100	1	20	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	and slowness				
F4-03	Startup frequency	0.00Hz to maximum frequency (F0-04)	0.01Hz	0.00Hz	★
F4-04	Startup frequency retention time	0.0s to 36.0s	0.1s	0.0s	★
F4-05	DC brake current at startup	0% to 100%	1%	0%	★
F4-06	DC brake time at startup	0.0s to 36.0s	0.1s	0.0s	★
F4-07	Speed-up/speed/down mode	0： Straight line speed-up and speed-down 1: S curve speed-up/ speed-down A 2:S curve speed-up/ speed-down B	1	0	★
F4-08	Start segment time of S curve	0.0% to 100.0%	0.1%	20.0%	★
F4-09	End	0.0% to 100.0%	0.1%	20.0%	★

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	segment time of S curve				
F4-10	Stop mode	0: Speed-down to stop 1: Free stop	1	0	☆
F4-11	DC brake at stop Startup frequency	0.00Hz to maximum frequency (F0-04)	0.01Hz	0.00Hz	☆
F4-12	DC brake at stop waiting time	0.0s to 36.0s	0.1s	0.0s	☆
F4-13	DC brake current at stop	0% to 100%	1%	0%	☆
F4-14	DC brake current at stop	0.0s to 36.0s	0.1s	0.0s	☆
F4-15	Brake utilization ratio	0% to 100%	1%	100%	☆
Group F5 Auxiliary Function					
F5-00	Jog running	0.00Hz to maximum frequency (F0-04)	0.01Hz	2.00Hz	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	frequency				
F5-01	Jog speed-up time	0.00s to 300.00s	0.01s	20.00s	☆
F5-02	Jog speed-down time	0.00s to 300.00s	0.01s	20.00s	☆
F5-03	Jog enabled during operation	0: Disabled 1: Enable	1	0	☆
F5-04	Speed-up time 2	0.00s(m) to 300.00s(m)	0.01s(m)	Model dependent	☆
F5-05	Speed-down time 2	0.00s(m) to 300.00s(m)	0.01s(m)	Model dependent	☆
F5-06	Skip frequency	0.00Hz to maximum frequency (F0-04)	0.01Hz	0.00Hz	☆
F5-07	Skip frequency amplitude	0.00Hz to maximum frequency (F0-04)	0.01Hz	0.00Hz	☆
F5-08	Dead zone time of Forward and	0.0s to 100.0s	0.1s	0.0s	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	reverse rotations				
F5-09	Reverse rotation control	0:Reverse rotation enabled 1:Reverse rotation disabled	1	0	☆
F5-10	Run with frequency below frequency lower limit	0： Run with frequency lower limit 1: Delay to stop	1	0	☆
F5-11	Delay duration of stop with frequency below frequency lower limit	0.0s to 3600.0s	0.1s	0.0s	☆
F5-12	Setup running time	0h to 65535h	1h	0h	☆
F5-13	Action selection at the arrival of running time	0: Continue to run 1: Stop	1	0	☆
F5-14	Startup protection	0: Disabled 1: Enabled	1	0	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	selection				
F5-15	Frequency detection value (FDT level)	0.00Hz to maximum frequency (F0-04)	0.01Hz	50.00Hz	☆
F5-16	Frequency detection hysteresis value	0.0% to 100.0%	0.1%	5.0%	☆
F5-17	Frequency arrival detection amplitude	0.0% to 100.0%	0.1%	0.0%	☆
F5-18	Random PWM gain	0 to 10	1	0	☆
F5-19	Modulation mode selection	**0:**Asynchronous modulation 1:Synchronous modulation	1	0	★
F5-20	Quick current limit function selection	0： Disabled 1： Enabled	1	1	★

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
F5-21	Wake-up frequency	Wake-up frequency to maximum frequency（F0-04)	0.01Hz	0.00Hz	☆
F5-22	Wake-up delay time	0.0s to 6500.0s	0.1s	0.0s	☆
F5-23	Sleep frequency	0.00Hz to maximum frequency （F0-04)	0.01Hz	0.00Hz	☆
F5-24	Sleep delay time	0.0s to 6500.0s	0.1s	0.0s	☆
F5-25	Software over-current points	0.0% to 300.0% （motor rated current）	0.1%	200.0%	☆
F5-26	Software over-current detection delay time	0.00s（not detection） 0.01s to 600.00s	0.01s	0.00s	☆
F5-37	Dead-zone compensation mode selection	0 to 1	1	0	★
F5-38	Cooling fan	0:Cooling fan startup of motor running	1	0	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	control	1: Cooling fan running after power-on			
Group F6 PID Function					
F6-00	PID reference source	0：F6-01 1: AI1 2: AI2 3: PULSE (DI5) 4: MS speed	1	0	☆
F6-01	PID numerical value setup	0.0% to 100.0%	0.1%	50.0%	☆
F6-02	PID reference change duration	0.0s to 3000.0s	0.1s	0.0s	☆
F6-03	PID feedback source	0：AI1 1：AI2 2：PULSE (DI5) 3：AI1-AI2	1	0	☆
F6-04	PID action direction	0: Positive 1: Negative	1	0	☆
F6-05	PID reference feedback range	0 to 65535	1	1000	☆
F6-06	Proporti	0.1 to 100.0	0.1	20.0	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	onal gain P				
F6-07	Integral time I	0.01s to 10.00s	0.01s	2.00s	☆
F6-08	Differential time D	0.000s to 10.000s	0.001s	0.000s	☆
F6-09	Deviation limit	0.0% to 100.0%	0.1%	0.0%	☆
F6-10	PID operation mode	0:Stop without operation 1: Operation upon stop	1	0	☆
Group F7 Swing Frequency, Fixed Length and Counting					
F7-00	Swing frequency setup mode	0: Relative to the center frequency 1: Relative to the maximum frequency	1	0	☆
F7-01	Swing frequency amplitude	0.00% to 100.0%	0.1%	0.0%	☆
F7-02	Kick frequency amplitude	0.0% to 50.0%	0.1%	0.0%	☆
F7-03	Swing frequency cycle	0.01s to 300.00s	0.01s	10.00s	☆
F7-04	Triangle wave boost time	0.1% to100.0%	0.1%	50.0%	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	coefficient				
F7-05	Setup length	0m to 65535m	1m	1000m	☆
F7-06	Actual length	0m to 65535m	1m	0m	☆
F7-07	Pulse numberper meter	0.1 to 6553.5	0.1	100.0	☆
F7-08	Setup counting value	1 to 65535	1	1000	☆
F7-09	Designated counting value	1 to 65535	1	1000	☆
F7-10	Load speed display coefficient	0.0001 to 6.5000	0.0001	1.0000	☆
F7-11	Decimal point position	0: No decimal place 1: One decimal place 2: Two decimal places 3: Three decimal places	1	1	☆
F7-12	Accumulated running time	0h to 65535h	1h	—	•
F7-13	LED running display parameter	1 to 65535	1	799	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
F7-14	LED stop display parameter	1 to 511	1	51	☆
F7-15	MF.K key function selection	0: MF.K invalid 1: Switching between the operation panel command channel and the remote command channel (terminal command channel or serial port command channel) 2: Switching between forward and reverse rotation 3: Forward jog	1	0	★
F7-16	STOP/RES key function	0: The stop function of STOP/RES key is valid only in the keyboard control mode. 1: The stop function of STOP/RES key is valid in any control mode.	1	0	☆
F7-17	Software version No.	0.01 to 655.35	—	—	●
Group F8 MS speed and PLC					
F8-00	MS speed 0 reference mode	0: F8-01 reference 1: AI1 2: AI2 3: pulse 4: PID 5:preset frequency （F0-03）reference, UP/DOWN can be changed	1	0	★

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
F8-01	MS speed 0	-100.0% to 100.0% (frequency upper limit F0-05)	0.1%	0.0%	☆
F8-02	MS speed 1	-100.0% to 100.0% (frequency upper limit F0-05)	0.1%	0.0%	☆
F8-03	MS speed 2	-100.0% to 100.0% (frequency upper limit F0-05)	0.1%	0.0%	☆
F8-04	MS speed 3	-100.0% to 100.0% (frequency upper limit F0-05)	0.1%	0.0%	☆
F8-05	MS speed 4	-100.0% to 100.0%(frequency upper limit F0-05)	0.1%	0.0%	☆
F8-06	MS speed 5	100.0% to 100.0% (frequency upper limit F0-05)	0.1%	0.0%	☆
F8-07	MS speed 6	-100.0% to 100.0% (frequency upper limit F0-05)	0.1%	0.0%	☆
F8-08	MS speed 7	-100.0% to 100.0% (frequency upper limit F0-05)	0.1%	0.0%	☆
F8-09	PLC running mode	0: Single running stop 1:Single running counting remains the final value 2: Continuous circulation	1	0	☆
F8-10	PLC power fault memory selection	0:Power fault without memory 1: Power fault memory	1	0	☆
F8-11	Running time unit	0: s (second) 1: h (hour)	1	0	☆
F8-12	0-segme	0.0s(h) to 6553.5s(h)	0.1s(h)	0.0s(h)	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	nt running time of PLC				
F8-13	Speed-up/speed-down time selection of 0-segment of PLC	0:Speed-up/speed-down time 1 1:Speed-up/speed-down time 2	1	0	☆
F8-14	Running time of the first segment of PLC	0.0s(h) to 6553.5s(h)	0.1s(h)	0.0s(h)	☆
F8-15	Speed-up/speed-down time selection of the first segment of PLC	0:Speed-up/speed-down time 1 1:Speed-up/speed-down time 2	1	0	☆
F8-16	Running time of the second segment of PLC	0.0s(h) to 6553.5s(h)	0.1 s(h)	0.0s(h)	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
F8-17	Speed-up/speed-down time selection of the second segment of PLC	0:Speed-up/speed-down time 1 1:Speed-up/speed-down time 2	1	0	☆
F8-18	Running time of the third segment of PLC	0.0s(h) to 6553.5s(h)	0.1s(h)	0.0s(h)	☆
F8-19	Speed-up/speed-down time selection of the third segment of PLC	0: Speed-up/speed-down time 1 1: Speed-up/speed-down time 2	1	0	☆
F8-20	Running time of the fourth segment of PLC	0.0s(h) to 6553.5s(h)	0.1s(h)	0.0s(h)	☆
F8-21	Speed-up/speed-down time	0: Speed-up/speed-down time 1 1: Speed-up/speed-down time 2	1	0	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	selection of the fourth segment of PLC				
F8-22	Running time of the fifrth segment of PLC	0.0s(h) to 6553.5s(h)	0.1s(h)	0.0s(h)	☆
F8-23	Speed-up/speed-down time selection of the fifth segment of PLC	0:Speed-up/speed-down time 1 1:Speed-up/speed-down time 2	1	0	☆
F8-24	Running time of the sixth segment of PLC	0.0s(h) to 6553.5s(h)	0.1s(h)	0.0s(h)	☆
F8-25	Speed-up/speed-down time selection of the sixth segment of PLC	0:Speed-up/speed-down time 1 1:Speed-up/speed-down time 2	1	0	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
F8-26	Running time of the seventh segment of PLC	0.0s(h) to 6553.5s(h)	0.1s(h)	0.0s(h)	☆
F8-27	Speed-up/speed-down time selection of the seventh segment of PLC	0: Speed-up/speed-down time 1 1: Speed-up/speed-down time 2	1	0	☆
Group F9 Reserved					
F9-00	**Reserved**				
Group FA Communication Parameters					
FA-00	Baud rate	0：300BPS 1：600BPS 2：1200BPS 3：2400BPS 4：4800BPS 5：9600BPS 6：19200BPS 7：38400BPS	1	5	☆
FA-01	Data format	0: No parity check 1: Even check 2: Odd check	1	0	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
FA-02	Local address	0 to 247, 0 is the broadcast address	1	1	☆
FA-03	Response delay	0ms to 20ms	1ms	2ms	☆
FA-04	Communication overtime	0.0s to 60.0s	0.1s	0.0s	☆
FB Fault and Protection					
FB-00	Motor overload protection selection	0: Invalid 1:Valid	1	1	☆
FB-01	Motor overload protection gain	0.20 to 10.00	0.01	1.00	☆
FB-02	Motor overload prealarm coefficient	50% to 100%	1%	80%	☆
FB-03	Over voltage stall gain	0 to 100	1	0	☆
FB-04	Over voltage stall protection voltage	120% to 150%	1%	130%	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
FB-05	Over current stall gain	0 to 100	1	20	☆
FB-06	Over current stall protection current	100% to 200%	1%	150%	☆
FB-07	Ground short circuit protection upon power-on	0: Invalid 1:Valid	1	1	☆
FB-08	Load fault protection function	0: Invalid 1: Valid	1	0	☆
FB-09	Transient stop/ non-stop function selection	0:Invalid 1:Valid	1	0	☆
FB-10	Transient stop/ non-stop frequency reduction rate	0.00Hz/s to maximum frequency(F0-04) /s	0.01Hz/s	10.00Hz/s	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
FB-11	Transient stop/ non-stop voltage recovery judgment time	0.00s to 100.00s	0.01s	0.50s	☆
FB-12	Transient stop/ non-stop action judgment voltage	60.0% to 100.0%	1%	80.0%	☆
FB-13	Fault auto reset times	0 to 10	1	0	☆
FB-14	Fault relay action selection during fault auto reset period	0：No action 1: Action	1	0	☆
FB-15	Fault auto reset interval	0.1s to 60.0s	0.1s	1.0s	☆
FB-16	Fault auto	0.1h to 1000.0h	0.1h	1.0h	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	reset times clearing time				
FB-17	Input phase fault protection selection	0:Invalid 1:Valid	1	1	☆
FB-18	Output phase fault protection selection	0:Invalid 1:Valid	1	1	☆
FB-19	Inverter module radiator temperature	-10℃ to 100℃	1℃	—	•
FB-20	The first fault type	0: No fault 1: Reserved 2: Speed-up over current (ERR02) 3: Speed-down over current (ERR03) 4: Constant speed over current (ERR04) 5: Speed-up over voltage(ERR05) 6 、 Speed-down over voltage(ERR06)	—	—	•

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
		7: Constant speed over voltage(ERR07) 8: Buffer resistance overload fault (ERR08) 9: Under voltage fault (ERR09) 10: Inverter overload (ERR10) 11: Motor overload (ERR11) 12: Input phase fault (ERR12) 13: Output phase fault (ERR13) 14: Radiator overheating (ERR14) 15: External fault(ERR15) 16: Communication fault (ERR16) 17: Contactor on/off fault (ERR17) 18: Current detection fault (ERR18) 19:Motor tuning fault 20: Reserved (ERR20) 21: EEPROM read/write fault (ERR21) 22: Reserved 23: Motor to ground short circuit fault(ERR23) 24: Reserved (ERR24) 25: Reserved (ERR25) 26: Running time arrival (ERR26) 31:Software over current fault（ERR31） 40： Fast current limit and overtime fault（ERR40） 41: Swithing motor fault（ERR41）			

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
FB-21	The second fault type	—	—	—	●
FB-22	The last fault type	—	—	—	●
FB-23	Frequency upon fault	—	—	—	●
FB-24	Current upon fault	—	—	—	●
FB-25	Bus voltage upon fault	—	—	—	●
FB-26	Input terminal status upon fault	—	—	—	●
FB-27	Output terminal . +- status upon fault	—	—	—	●
FB-28	Under voltage	60.0% to 140.0% Three phase : 100.0%	0.1%	100.0%	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	points selection	corresponding bus voltage of 350.0V. Two phase：100.0% corresponding bus voltage of 200.0V			
FB-29	Zero current detection level	0.0% to 300.0% 100.0%correspondingmmotro rated current	0.1%	5.0%	☆
FB-30	Zero current detection delay time	0.01s to 600.00s	0.01s	0.10s	☆
Group FC The second motor parameters					
FC-00	The second motorrated power	0.2Kw to 1000.0kW	0.1kw	Model dependent	★
FC-01	The second motor rated voltage	0V to 480V	1V	Model dependent	★
FC-02	The second motor rated current	0.1A to 6553.5A	0.1A	Model dependent	★
FC-03	The	0.01Hz to maximum frequency	0.01Hz	Model	★

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	second motorrated frequency	（F0-04)		dependent	
FC-04	No-load current	0.1A to 6500.0A	0.1A	Model dependent	☆
FC-05	The second stator resistance	0.001Ω to 65.535Ω	0.001Ω	Model dependent	☆
FC-06	The second Torque hoist	0.0%（auto） 0.1% to 30.0%	0.1%	Model dependent	☆
FC-07	The second slip compensation coefficient	0.0% to 200.0%	0.1%	0.0%	☆
FC-08	Oscillation suppression gain of The second motor	0 to 100	1	Model dependent	☆
FC-09	Speed-up/speed-	0：Be consistent with the first motor	1	0	☆

Function code	Name	Setup Range	Minimum Unit	Factory Default Value	Change
	down time selection of the second motor	Speed-up/speed-down time 1 Speed-up/speed-down time 2			
Group FF Factory Default Parameters					
FF-00	Factory default password	Reserved		Reserved	*
Group FP User password					
FP-00	User password	0 to 65535	1	0	☆
FP-01	Parameter initialization	0:No operation 1. Recover Factory default value 2: Clear the record information	1	0	★

6

Parameter Description

Chapter 6 Parameter Description

Group F0 Basic Function Group

F0-00	**Command source selection**		Factory default value	0
	Setup value	0	Operation panel command channel	
		1	Terminal command channel	
		2	Serial port communication command channel	

Inverter control commands include: run, stop, forward rotation (FWD), reverse rotation (REV), forward jog (FJOG), reverse jog (RJOG), etc.

0: Operation panel command channel (“LOCAL/REMOT” LED is off);

Perform running command control with RUN, MF.K and STOP/RES keys on the operation panel.

1: Terminal command channel (“LOCAL/REMOT” LED is on);

Perform running command control with multifunctional input terminals such as FWD, REV, FJOG, RJOG, and so on.

2: serial port communication command channel (“LOCAL/REMOT” LED flashes).

The running command is given by the host computer via the communication mode. For the communication protocol, refer to MD280F Serial Communication Protocol for details.

Caution: Modification of this parameter may change the command source channel when the inverter is running. Therefore, please be caution of modifying this parameter.

F0-01	Frequency source selection		Factory default value	0
	Setup range	0	Digital setting (UP and Down adjustment)	
		1	AI1	
		2	AI2	

		3	PULSE setting (DI5)
		4	MS speed
		5	PLC
		6	PID
		7	AI1＋AI2
		8	Communication reference
		9	PID + AI1
		10	PID + AI2

Select the input channel for inverter reference frequency. There are 8 reference frequency channels, which include:

0: Digital setting (UP and Down adjustment)

The initial value is the setting value of “pre-set frequency” (F0-F3).

It can modify the setup frequency value of the inverter with UP and DOWN keys on the keyboard or multifunctional input terminals UP and DOWN. The Up and Down keys on the keyboard or terminals may be modified under the current frequency in the stop or run status of the inverter. For details regarding the function setting of terminals UP and DOWN, refer to Group F2 “Terminal UP” and “Terminal DOWN”.

1：AI1

2：AI2

It means that the frequency is determined by the analog input terminal. AI1 is used for 0 to 10V voltage input. AI2 can be used for 0 to 10V voltage input or 4 to 20mA current input, which can be selected by the J3 jumper on the control panel. The potentiometer on the external keyboard and AI2 channel on the control panel cannot be enabled at the same time and shall be selected by the J2 jumper on the control panel. Refer to the description of Group F2 function codes (F2-08 to F2-19) for the settings of AI1 and AI2 input frequencies.

3: PULSE setting (DI5)

The frequency is given via the input pulse of the terminal. Pulse reference

signal specification: voltage range: 9V to 30V; frequency range: 0kHz to 50kHz.

When the frequency source is “PULSE reference (DI5), pulse reference can only be input via the multifunctional input terminal DI5 and DI5 is pulse frequency input function terminal by default and other settings are not required.

Caution: When DI5 is used as pulse input, it needs to set the input terminal DI5 to 0 (no function) so as to avoid triggering error action.

4: MS speed

Select MS speed running mode. It needs to set Group F2 “Input Terminals” (F2-00 to F2-04) and MS reference parameters of Group F8 “MS Speed and PLC” (F8-00 to F8-08) to determine the corresponding relationship between the terminal reference signal and the reference frequency.

For details regarding the function setting of terminals and MS speed, refer to the function description of “MS Speed Terminal” of input terminal DI of Group F2.

5. PLC

Select simple PLC mode. When the frequency source is simple PLC, it needs to set the parameters of Group F8 “MS Speed and PLC” to determine the reference frequency at each running phase. Refer to the description of Group F8 function codes for the PLC running setup.

6: PID

Select PID process control.In this case, it needs to set Group F6 “PID Function”. Inverter operation frequency is the frequency after PID reacts.Refer to “PID Function” settings in Group F6 for meanings of PID reference source, reference parameter, and feedback source, etc.

7: AI1 +AI2

It means that the frequency is given by adding the setting value of input terminal AI1 to the setting value of AI2. Refer to the description of Group F2 function codes (F2-08 to F2-19) for the settings of AI1 and AI2 input frequencies.

8: Communication reference

The frequency source is given by the host computer via the communication

mode. For the communication protocol, refer to MD280F Serial Communication Protocol for details.

9、PID + AI1

It means that the frequency is set by PID and AI1 overlap setup.

Caution: PID reference source（F6-00）and PID feedback source （F6-03）can not be selected to AI1.

10、PID + AI2

It means that the frequency is set by PID and AI1 overlap setup.

Caution: PID reference source（F6-00）and PID feedback source （F6-03）can not be selected to AI2.

F0-02	Digital setup frequency memory selection		Factory Default Value	0
	Setup range	0	Without memory	
		1	Power fault memory	
		2	Stop memory	
		3	Stop and power fault memories	

0: Without memory: Upon power fault or stop of the inverter, set the frequency value back to the setup value of “Preset Frequency” (F0-03).

1: Power fault memory: Upon power fault (in running or stop status) of the inverter, set the frequency value back to the setup value of “Preset Frequency” (F0-03).

2: Stop memory: When the inverter stops, the setup frequency before stopping is memorized.

3: Stop and power fault memories: If the inverter is powered on upon power fault, the setup frequency is the value at the time of power fault. If the inverter stops, the setup frequency before stopping is memorized.

F0-03	**Preset frequency**	Factory default value	50.00Hz
	Setup range	0.00Hz to maximum frequency （F0-04）	

It is only valid when frequency source (F0-F1) is set to “digital setting”.When set the frequency source to “digital setting”, the parameter

value is the initial value of the inverter frequency.

F0-04	**Maximum frequency**	Factory default value	50.00 Hz
	Setup range	50.00Hz to 630.00Hz	

It is used to set the maximum output frequency of the inverter.

F0-05	Frequency upper limit		Factory default value	0
	Setup range	0	F0-06 setting
		1	AI1
		2	AI2
		3	Pluse setting（DI5）

It is used to select the reference channel of frequency upper limit.

F0-06	**Frequency upper limit**	Factory default value	50.00Hz
	Setup range	Frequency lower limit（F0-07） to maximum frequency（F0-04）	

It is used to set the frequency upper limit output by the inverter.

F0-07	Frequency lower limit	Factory default value	0.00Hz
	Setup range	0.00Hz to frequency upper limit （F0-06）	

It is used to set the frequency lower limit output by the inverter.

When the running frequency of the inverter is lower than the frequency lower limit, it can select to run or stop the inverter at frequency lower limit. Refer to F5-10 function code for details. I

F0-08	**Speed-up/speed-down time unit**		Factory default value	0
	Setup range	0	s (second)	
		1	m (minute)	

It is used to select the unit of Speed-up/speed-down time of the inverter.It is valid for speed-up time 1（F0-09),speed-down time 1（F0-10),speed-up time 2 （F5-04）and speed-down time 2 （F5-05）.

F0-09	Speed-up time 1	Factory default value	Model dependent
	Setup range 0.00s(m) to 300.00s(m)		
F0-10	Speed-down time 1	Factory default value	Model dependent
	Setup range 0.00s(m) to 300.00s(m)		

The acceleration time means the time t1 needed for the inverter to accelerate from 0Hz to the maximum output frequency (F0-04).

The deceleration time means the time t2 needed for the inverter to decelerate from the maximum output frequency (F0-04) to 0Hz.

The descriptions on acceleration and deceleration time are as shown in Fig. 6-1:

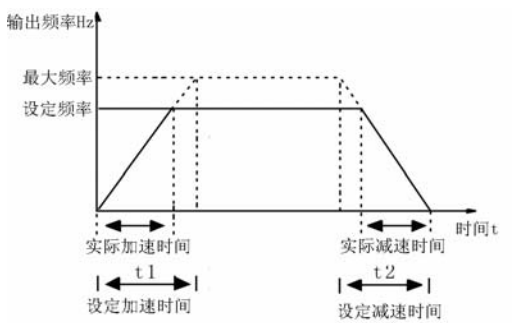


Fig.6-1 schematic Diagram for speed-up/speed-down time

输出频率：Output frequency
最大频率：Maximum frequency
设定频：Setting frequency
实际加速时间：Actual speed-up time
设定加速时间:Setting speed-up time
实际减速度时间:Actual speed-down time
设定减速时间 Setting speed-down time
时间 Time

There are totally two groups of speed-up/speed-down time for selection:
Speed-up/speed-down time 1: F0-09 and F0-10;
Speed-up/speed-down time 2: F5-04 and F5-05;
The two groups of Speed-up/speed-down time can be selected through the external digital input terminal DI. Refer to the function description of

"Speed-up/speed-down Selection Terminal" of function codes of Group F2-00 to F2-04 for details.

F0-11	**Carrier frequency**	Factory default value	Model dependent
	Setup range	0.5kHz to 16.0kHz	

This function is used to adjust the carrier wave frequency of the inverter. By adjusting the carrier wave frequency, the motor noise can be reduced, the resonance of the mechanical system can be avoided, so that the leakage current to the ground and the interference of the inverter can be reduced.

When the carrier wave frequency is low, the output current higher harmonic component will be increased, the motor loss will be increased, and the motor temperature rise will also increase.

When the carrier wave frequency is high, the motor loss is reduced, and the motor temperature is reduced also, but the inverter loss and inverter temperature rise will be increased, and thus the interference will be increased.

The adjustment of carrier frequency will have the following influences on the performance:

Carrier frequency	Low → High
Motor noise	High → Low
Output current waveform	Poor → Good
Motor temperature rise	High → Low
Inverter temperature rise	Low → High
Leakage current	Low → High
Radiation interference	Low → High

F0-12	**Running direction**		Factory default value	0
	Setup range	0	Consistent direction	
		1	Reverse direction	

Modification of this parameter can change the rotary direction of the motor without changing any other parameters, which is equivalent to the role of

switching the rotary direction through adjusting any two lines of the motor (U, V and W). The changed direction is still the forward running direction of the inverter.

When it needs to change the rotary direction of the motor, it can modify this parameter rather than adjust the wiring of the motor.

Caution: When the function code is restored to the factory default value, this parameter value is restored to 0, which shall be used prudently in the applications where the motor rotary direction is not allowed to change.

F0-13	**Speed-up/speed-down reference frequency**		Factory default value	0
	Setup value	0	Maximum frequency	
		1	Setting frequency	

When it's selected to 0, the speed-up time means the time needed for the inverter speeds up from 0Hz to the maximum frequency, speed-down time means the time needed for the inverter speeds up from 0Hz to setting frequency,speed-down time means the time needed for the inverter speeds down from setting frequency to 0Hz.

F0-14	Frequency UP/DOWN reference upon running		Factory defult value	0
	Setup range	0	Running frequency	
		1	Setting frequency	

When it's selected to 0 (running frequency), it means the keyboard or the terminal of UP / DOWN can be changed under the current operating frequency of the inverter.

When it's selected 1 (running frequency), it means the keyboard or the terminal of UP / DOWN can be changed under the current operating frequency of the inverter.

F0-15	**Auxiliary Frequency source Y selection**		Factory default value	0
	Setup range	0	Digital setup(UP and DOWN adjustment)	
		1	AI1	
		2	AI2	
		3	PULSE setup (DI5)	
		4	MS speed	
		5	PLC	

		6	PID
		7	AI1＋AI2
		8	Communication setup

When the auxiliary frequency source is used as independent frequency reference channel (i.e. frequency source switching from X to Y"), it is used in the same way as the main frequency source X.

When the auxiliary frequency source is used as overlap reference (i.e. frequency source selection switching from X plus Y or X to X plus Y), it has special points as follows:

1. When the auxiliary frequency source is digital reference, the preset frequency (F0-08) has no action, and it needs to adjust the main reference frequency through the keys "▲"and "▼" of the keyboard (or UP and DOWN of multifunctional input terminals).

2、When the auxiliary frequency source is analog input reference (AI1, AI2) or pulse input reference, 100% of input setup is relative to the auxiliary frequency source range (refer to F0-16 and F-17). To adjust the main reference frequency, it needs to set the corresponding setup range of analog input to "-n% to n% (refer to F2-08～F2-19).

3. When the frequency source is pulse input reference, it is similar to the analog value.

Prompt: There is difference between the auxiliary frequency source Y selection and the main frequency source X setup value. That is to say, the main and auxiliary frequency sources cannot use the same frequency reference channel.

F0-16	Auxiliary Frequency source Y relative value selection		Factory default value	0
	Setup Range	0	Relative to maximum frequency	
		1	Relative to frequency source X	
F0-17	Auxiliary Frequency source Y		Factory default value	0
	Setup Range	0% to 150%		

When the frequency source selection is frequency overlap reference (F0-18 is set to 1 or 3), it is used to determine the adjustment range of

auxiliary frequency source. F0-16 is used to determine the relative object of that range. If it is relative to maximum frequency X, that range will vary with the main frequency X.

F0-18	Frequency source selection		Factory default value	0
	Setup Range	0	Main frequency source X	
		1	Main frequency source X plus auxiliary frequency source Y	
		2	Switching between main frequency source X and auxiliary frequency source Y	
		3	Switching between main frequency source X and (main frequency source X plus auxiliary frequency source Y)	
		4	Switching between main frequency source Y and (main frequency source X plus auxiliary frequency source Y)	

This parameter is used to select the frequency reference channel. Frequency reference is realized through combination of main frequency source X and auxiliary frequency source Y.

When 1 is selected, the frequency source “main frequency source X plus auxiliary frequency source Y” can realize frequency overlapping function.

When 2 is selected, it can switch between the main frequency source X and auxiliary frequency source Y via the multifunctional input terminal “Frequency Source Switching”.

When 3 is selected, it can switch between the main frequency source X and (main frequency source X plus auxiliary frequency source Y) via the multifunctional input terminal “Frequency Source Switching”.

When 4 is selected, it can switch between the auxiliary frequency source Y and (main frequency source X plus auxiliary frequency source Y) via the multifunctional input terminal

“Frequency Source Switching”.

In this way, it can realize mutually switching between the frequency reference modes, such as switching between PID running and common running, switching between simple PLC and common running, switching between pulse setup and analog setup, and switching between analog setup and common running.

F0-20	Auxiliary frequency source offset digital setup	Factory default value	0.00Hz
	Setup range	0.00Hz to Maximum frequency F0-04	

It is valid only at the time of frequency source overlap reference.

Group F1 Motor Parameter, V/F Control Parameter

F1-00	**Rated power**	Factory defult value	Model dependent
	Setup range	0.2kW to1000.0kW	
F1-01	**Rated voltage**	Factory defult value	Model dependent
	Setup range	0V to 480V	
F1-02	**Rated current**	Factory defult value	Model dependent
	Setup value	0.1A to 6553.5A	
F1-03	**Rated frequency**	Factory defult value	Model dependent
	Setup range	0.00Hz to maximum frequency （F0-04）	

Caution

1、 Please set the parameters according to the nameplate parameters of the motor.

2、To ensure the control performance, the motor shall be configured according to the standard configuration of the motor. If the motor power has significant difference with the configuration of the standard motor, the control performance of the inverter may be degraded.

3、When Modify the rated power, the drive power estimates under the rated current, no-load current, stator resistance. Therefor, please set the rated power, and then set the rated current, no-load current, stator resistance.

F1-04	**V/F curve setup**			Factory defult value	0
	Set	0	Straight V/F curve		

	range	1	Multi-point V/F curve
		2	Square V/F curve

This parameter defines the V/F setup way so as to meet the requirements of various load characteristics.

0: Straight V/F curveIt is suitable for the ordinary command torque load.
1. Multi-point V/F curve. It is suitable for such special loads as dehydrator and centrifugal machine. It can be self-defined. Refer to the description of functional codes of Group F1-07 to F1-12 for details.
2: Square V/F curve. It is suitable for such special loads as fan and pump.

F1-05	Toruqe hoist	Factory default value	1.0%
	Setup range	0.0%（auto）to 30.0%	
F1-06	Torque hoist cut-off frequency	Fatory default value	50.00Hz
	Setup range	0.00Hz to maximum output frequency（F0-04）	

To compensate the V/F control low frequency torque characteristics, increase compensation will be provided for the inverter output voltage upon low frequency.

Torque hoist: it will be set according to the percentage of input rated voltage to the inverter. Below are explanations of setting torque increase:

1) When the torque hoist is set as 0.0%, the inverter will adopt auto torque hoist.

2) This parameter can be properly hoisted for small motor, while for large motor; the parameter can be properly decreased.

3) If the torque hoist is set to be too large, the motor may have over temperature, and the inverter may have over-current.

Torque hoist cut-off frequency: As shown in Fig. 6-2, the torque hoist is valid when the cutoff frequency is below this setting frequency. Otherwise, the torque hosit will be invalid.

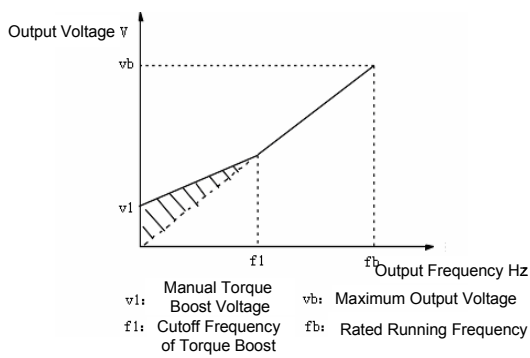


Fig. 6-2 schematic diagram for manual torque hoist

F1-07	Multi-point V/F frequency point f1	Factory default value	0.00Hz
	Setup range	0.00Hz to F1-09	
F1-08	Multi-point V/F voltage point v1	Factory default value	0.0%
	Setup range	0.0% to 100.0%	
F1-09	Multi-point V/F frequency point f2	Factory default value	0.00Hz
	Setup range	F1-07 to F1-11	
F1-10	Multi-point V/F voltage point v2	Factory default value	0.0%
	Setup range	0.0% to 100.0%	
F1-11	Multi-point V/F frequency point f3	Factory default value	0.00Hz
	Setup range	F1-09 to rated frequency of motor (F1-03)	
F1-12	Multi-point V/F voltage point v3	Factory default value	0.0%
	Setup range	0.0% to 100.0%	

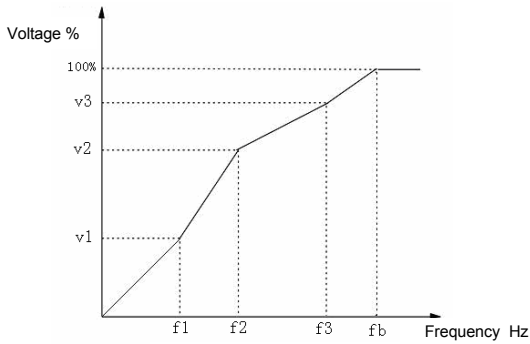
Six parameters of F1-07 to F1-12 define the multi-point V/F curve. The frequency point setup range is 0.00Hz to rate frequency of motor, and the voltage setup range is 0.0% to 100%, which corresponds to 0V to rated voltage of motor.

The setup value of multi-point V/F curve is generally set in accordance with the load characteristics of the motor. The setting of multi-point V/F curve is as shown in Fig.6-3.

Caution:

1) It must set as follows: F1-05<=F1-09<=F1-11. To ensure the setup is correct, this inverter imposes restriction on the relationship between the upper limit and the lower limit of frequency points F1-07, F1-09 and F1-11. It must set F1-07 firstly, followed by F1-09 and F1-11.

2) If the voltage is set too high at the time of low frequency, it may cause overheating and even burning of the motor as well as stall over current or over current protection of the inverter.



f1～f3：Points 1 to 3 Voltage Proportion of Multi-point V/F
v1～v3：Points 1 to 3 Frequency Point of Multi-point V/F
fb：Rated Motor Frequency

Fig6- 3 Schematic Diagram for Multi-point V/F Curve

F1-13	Slip compensation coefficient		Factory default value	0.0%
	Setup value	0.0% to 200.0%		

The V/F control slip caused by the load can be compensated by setting this parameter, so that the motor rotary speed will decrease following the decrease of the load change for V/F control. In general, 100% corresponds to the rated slip of the motor with rated load.

The slip coefficient adjustment may be performed referring to the following principle: When the load is rated load, and the slip compensation coefficient is set to 100%, the rotary speed of the motor is close to the reference speed.

F1-14	Over excitation gain		Factory default value	64
	Setup range	0 to 200		

The role of over excitation gain function is to suppress the rise of bus voltage during the inverter deceleration, thus avoiding occurrence of over voltage fault due to bus voltage exceeding over voltage protection limitation value. The higher the over excitation gain is, more powerfully the suppression effect is. The setting is described as follows:

1) In the applications where the inertia is very low, the over excitation gain is set to 0, while in the applications where the inertia is high, it needs to improve the over excitation gain properly.
2) In the applications where there is brake resistor, the over excitation gain must be set to 0.

F1-15	**No-load current**	Factory default value	Model dependent
	Setup range	0.1A to motor rated current （F1-02）	
F1-16	Stator resistance	Factory default value	Model dependent
	Setup range	0.001Ω to 65.535Ω	

It needs to be set according to the motor parameters. If this value is set wrongly, it may affect the motor control performance. If it is uncertain, please contact the motor manufacturer.

F1-17	Oscillation suppression gain	Factory default value	Model dependent
	Setup range	0 to100	

When the motor has no oscillation, please select this gain as 0. Only when the motor has obvious oscillation and does not run normally can the gain be properly increased. The bigger the gain is, the better oscillation suppression result will be.

The gain shall be set as small as possible under the condition that the oscillation is suppressed effectively so as to avoid high influences on the V/F operation.

F1-18	**Tunig selection**		Factory default value	0
	Setup range	0	No operation	
		1	Static tuning	

Prompt:Correct motor ratings must be set before tuning (F1-00 to F1-03）.

0: No operation, tuning is disabled.

1：Static tuning, Rotor resistance of the motor is detected automatically.

Action description:

Set the function code to 1 and press RUN key for confirmation, and then the inverter will conduct static tuning.

Tuning operation description:

Select the command source (F0-00) as the command channel of the operation panel.

Set correct motor parameter (F1-00 to F1-03）;

When it is set to 1, press ENTER key and “TUNE” will be displayed and flashes. Press RUN key to conduct parameter tuning, and at this time the displayed “TUNE” stops flashing. After the tuning is completed, the display will return to the stop status interface.The tuning process can be stopped by pressing the STOP key.

When the tuning is completed, the value of F1-11 will automatically restore to 0.

Caution: Tuning is valid only in the keyboard control mode.

F1-19	Oscillation suppression mode	Factory default value	Model dependent
	Setup vlaue	0 to 3	

0：Oscillation suppression is not dependent on no-load current, which is valid only below 15Hz.

1: Oscillation suppression is dependent on no-load current, which is valid by default.

2: Oscillation suppression is dependent on no-load current, which is valid only below 15Hz.

3: Oscillation suppressions is dependent on no-load current, which is valid.

Group F2 Input Terminal

MD280 series inverter has 5 multifunctional digital input terminals (DI1 to DI5), of which DI5 can be used as high-speed pulse input terminal, and ME280 series inverter also has two analog input terminals (AI1 and AI2).

Caution:
1: When DI5 as high-speed pluse input terminal,set function setup of input terminal DI5 to zero(no function)so as to avoid malfunction. When DI5 is high-speed pluse input, it can be the frequency source, Frequency source upper limit, PID setup source, PID feedback source, and setup source of MS zero-segment.
2: For the counter input and the length count input, please use DI5 when the pluse frequency is higher.When use low-speed pluse, and use DI1 to DI4.

F2-00	DI1 terminal function selection	Factory default value	1(Forward rotation)
F2-01	DI2 terminal function selection	Factory default value	2 (Reverse rotation)
F2-02	DI3 terminal function selection	Factory default value	4(Forward rotation Jog)
F2-03	DI4 terminal function selection	Factory default value	8(Free stop)
F2-04	DI5 terminal function selection	Factory default value	0(No function)

Parameters below are used to set the corresponding functions for the digital multi-purpose input terminals. Functions of DI terminal could not be selected repeatedly except zero. If a function is unable to be selected, please check whether the function has been selected by other terminals.

Setup value	Function	Description
0	No function	The input terminals have no function.
1	Forward rotation （FWD）	When command source (F0-00) is set as “terminal command channel”, forward or reverse running of the inverter will be controlled via the external terminal.Refer to description of functional codes of group F2-06 for the settings of forward and
2	Reverse rotatio （REV）	
3	Three-line running control	

Setup value	Function	Description
		reverse rotations.
4	Forward rotation Jog（FJOG）	The forward jog and reverse jog of the inverter are controlled via the external terminals. Refer to the descriptions of function codes F5-00, F5-01 and F5-02 for the details of jog running frequency and jog speed-up/speed-down time.
5	Reverse rotation Jog（RJOG）	
6	Terminal UP	When command source (F0-01) is set as “Digital Setup”, the increase or decrease of the setup frequency is implemented through the external terminal. The increase/decrease velocity is set by F2-07.
7	Terminal DOWN	
8	Free stop	When this terminal command is valid, meaning that the inverter locks the output, the load will free stop according to the mechanical inertia.
9	Fault reset (RESET)	When this terminal command is valid, inverter’s fault can be reset. The function is a valid pluse.
10	Pause during operation	When this terminal command is valid, the inverter sets the way of stop according to F4-10 function code. If it is PLC running at this time, it will memorize the frequency and running time of the running phase at the pause time, during which the PLC does not count the time.
11	External fault normally open input	External fault signal can be inputted through the external terminal for monitoring fault of external equipments by inverter.When the inverter detects that external equipments occur fault, it will stop and report “ERR15” fault.The fault signal input can adopt either normally open or normally closed mode. The enxternal fault normally open input is selected, it may occur fault when the
12	External fault normally closed input	

Setup value	Function	Description
		terminal is closed. The external fault normally open input is selected, it may occur fault when the terminal is open.
13	MS speed terminal 1	The setting of 8-segment speeds can be realized by the combinations of the terminal status when the frequency source (F—01) is “MS Speed”. Refer to Fig.6-4 for details. MS zero is seleted by function code of F8-00.
14	MS speed terminal 2	
15	MS speed terminal 3	
16	Speed-up/speed-down time selection terminal	With this terminal, it can implement switching between speed-up/speed-down time 1 and speed-up/speed-down time 2. When the terminal command is invalid, the speed-up/speed-down time 1 is selected by default; when the terminal command is valid, the speed-up/speed-down time 2 is selected.
17	UP/DOWN setup clearing (terminal and keyboard)	When the frequency source (F0-01) is given as “Digital Setup” and the terminal command is valid, it can clear the frequency values changed through keyboard or terminals UP/DOWN and restore the reference frequency to the setup value of “Preset Frequency" (F0-03).
18	DC brake terminal at stop	When this terminal is valid, it must implement DC brake at stop immediately according to the brake current at stop as set in F4-13 function code. At this time the RUN indicator lights, displaying a frequency of 0Hz.

Setup value	Function	Description
19	Speed-up/speed-down disabled	When this terminal command is valid, it can maintain the current frequency output while stopping.
20	PID pause	When this terminal command is valid, the PID stops adjustment, and the inverter maintains the current frequency output.
21	PLC status reset	When this terminal command is valid, it clears the memorized PLC running phase and running time, and restores to the initial status of PLC running.
22	Swing frequency pause	When this terminal command is valid, the inverter maintains the frequency output of the swing frequency center, and the swing frequency pauses.
23	Counter input (DI5)	It is used as input terminal of the counting pulse.
24	Counter reset	When this terminal command is valid, it clears the counting value of the counter to zero.Refer to the description of F7-08 and F7-09 function codes for the counting function.
25	Length counting input (DI5)	It is used as pulse input terminal of the length counting.
26	Length counting reset	When this terminal is valid, it clears the length counting to zero. Refer to the description of F7-05, F7-06 and F7-07 function codes for the length counting function.
27	Interchange of AI1 and AI2 settings	When this terminal command is valid, interchange AI1 and AI2 setting value. But it does not affect the maximum input corresponding setting mode of AI1 and AI2.
28	Frequency source switching switches to AI1	When the terminal command is valid, the current frequency switches to AI1 reference.It is valid only for setting F0-18 （frequency source overlapping selection）to 0.

Setup value	Function	Description
27	AI1 is used as the function selection of DI6	AI is used as DI, but the ground of AI (GND) and DI (COM) are not to breakover.
28	AI2 is used as the function selection of DI7	
29	DC brake enable at stop	When this terminal command is valid, it must implement DC brake at stop according to the DC brake initial frequency at stop, DC brake waiting time at stop, DC brake current at stop and DC brake time at stop as set in function codes of F4-11 to F4-14. When this function is not selected, the function of DC brake at stop is valid by default.
30	Keyboard command source switching	When this terminal command is valid, the reference channel of the current frequency source is forced to switch to reference of “Operation Panel Channel".
31	Terminal command source switching	When this terminal command is valid, the reference channel of the current frequency source is forced to switch to reference of “Terminal Command Channel".
32	Switching for the first motor and the second motor	When terminal command is valid, switching for the second motor.
33	频率源切换 Frequency source switching	When the frequency source selection (F0-07) is set to 2, it performs switching between main frequency source X and auxiliary frequency source Y via this terminal. When the frequency source selection (F0-07) is set to 3, it performs switching between main frequency source X and (main frequency X plus auxiliary

Setup value	Function	Description
		frequency source Y) via this terminal. When the frequency source selection (F0-07) is set to 4, it performs switching between auxiliary frequency source X and (main frequency X plus auxiliary frequency source Y) via this terminal.

Caution:

1: The source keyboard command switching of DI terminal has priority over the source terminal command switching of DI terminal.When the keyboard command source switching or terminal command source switching is valid, the MF.K function is invalid for control panel command channel and remote command channel switching.

2: The second motor paramerter is set by group FC function code. V/F curve is straight by default, speed-up/speed-down time is determined by function code of FC-09.

K_3	K_2	K_1	Frequency setting	Corresponding parameter
OFF	OFF	OFF	MS speed 0	F8-00
OFF	OFF	ON	MS speed 1	F8-02
OFF	ON	OFF	MS speed 2	F8-03
OFF	ON	ON	MS speed 3	F8-04
ON	OFF	OFF	MS speed 4	F8-05
ON	OFF	ON	MS speed 5	F8-06
ON	ON	OFF	MS speed 6	F8-07
ON	ON	ON	MS speed 7	F8-08

Fig. 6-4 Schematic Diagram for the Setting of MS Speed Terminal

Terminal K_1: It is set to the function of MS speed terminal 1

Terminal K_2: It is set to the function of MS speed terminal 2

Terminal K_3: It is set to the function of MS speed terminal 3

F2-05	DI filtering time		Factory default value	4
	Setup range	0 to 10		

If the digital input terminal is venerable to interference and may cause malrunction, increase the parameter value to enhance the interference immunity. However, this operation will cause reduced sensitivity of the DI terminal.

F2-06	Terminal command mode		Factory defult value	0
	Setup value	0	Two-line mode 1	
		1	Two-line mode 2	
		2	Three-line mode 1	
		3	Three-line mode 2	

This parameter defines four different modes of controlling the forward and reverse rotations of the inverter via the external terminal. The FWD terminal, REV terminal and DIn terminal mentioned below refer to forward rotation terminal, reverse rotation terminal and three-line mode running control terminal respectively.

0：Two-line running mode 1: This mode is the mostly used forward/reverse rotation control mode. The forward/reverse rotation of the motor is decided

by the FWD and REV terminal commands. The descriptions on the terminal running command are as shown in Fig. 6-5:

K1	K2	Running Direction Selection
0	0	Stop
1	0	Forward Rotation
0	1	Reverse Rotation
1	1	Stop

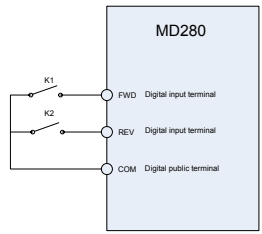


Fig6-5 Two-line Running Mode 1

1: Two-line running mode 2: FWD terminal serves as running enable terminal, and the running direction depends on the status of REV terminal, while the stop command is performed by disconnecting the FWD terminal. The descriptions on the terminal running command are as shown in Fig. 6-5:

K1	K2	Running Direction Selection
0	0	Stop
0	1	Stop
1	0	Forward Rotation
1	1	Reverse Rotation

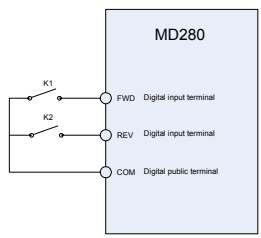


Fig.6-6 Two-line Mode Running Mode 2

1: Three-line running mode 1: DIn terminal serves as running enable terminal, and the forward/reverse rotation is controlled by FWD and REV terminals respectively, with actibe rising edge, while the stop command is performed by disconnecting the DIn terminal. The descriptions on the terminal running command are as shown in Fig. 6-7:

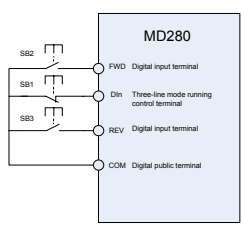


Fig6- 7 Three-line Mode Running Mode 1

Where,
SB1: Running enable button and stop button
SB2: Forward rotation button
SB3: Reverse rotation button
DIn ranges between DI1 and DI5. In this case, it shall define the corresponding terminal function setting as No.3 function “Three-line Running Control”.
3: Three-line running mode 2: DIn terminal serves as running enable terminal, and the running command is given by the FWD terminal, while the running direction depends on the status of REV terminal. The stop command is performed by disconnecting the DIn terminal. The descriptions on the terminal running command are as shown in Fig. 6-8:

K	Running Direction Selection
0	Forward Rotation
1	Reverse Rotation

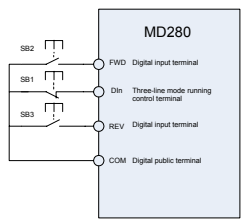


Fig 6-7 Three Mode Running Mode 2

Where,
SB1: Running enable button and stop button
SB2: Running button
K: The switch for direction selection.

F2-07	Terminal UP/DOWN velocity	Factory default value	1.00Hz/s
	Setup range	0.01Hz/s to 100.00Hz/s	

It is used to set the change rate when the setup frequency is adjusted with terminals UP/DOWN.

F2-08	**AI1 minimum input**		Factory default value	0.02V
	Setup value		0.00V to F2-10	
F2-09	Corresponding setup of AI1 minimum input		Factory default value	0.0%
	Setup value		-100.0% to100.0%	
F2-10	AI1 maximum input		Factory default value	10.00V
	Setup value		F2-08 to 10.00V	
F2-11	Corresponding setup of AI1 maximum input		Factory default value	0
	Setup value	0	F2-12	
		1	Set by AI2	
F2-12	Corresponding setup of AI1 maximum input		Factory default value	100.0%
	Setup value	-100.0% to 100.0%		
F2-13	**AI1 input filtering time**		Factory default value	0.10s
	Setup value	0.00s to 10.00s		

The parameters above mentioned define the relationship between analog input voltage and the analog input setup value. When analog input voltage exceeds the set maximum input or minimum input limit, the voltage beyond the limit will be calculated by maximum input or minimum input as shown in Fig. 6-9.

AI input filtering time: AI1 input signal will be filtered.The longer the filtering

time lasts, the stronger the interference immunity will become, but adjustment response will be slow down; the shorter the filtering time lasts, the faster the response will be, but the interference immunity will become weak.In various application cases, the nominal value corresponding to 100% of analog reference will be different. Refer to specific application description for the specific value.

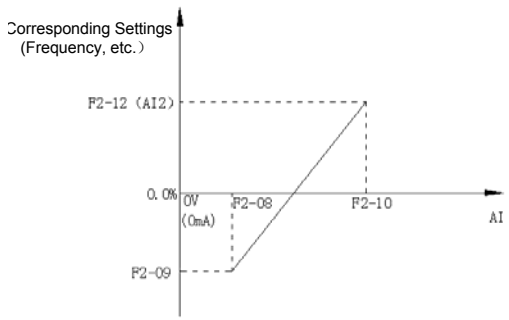


Fig6-4 Corresponding relation between analog reference and setting value

F2-14	AI2 minimum input		Factory default value	0.02V
	Setup range	0.00V to F2-16		
F2-15	Corresponding Setup of AI2 minimum input		Factory default value	0.0%
	Setup range	-100.0% to 100.0%		
F2-16	AI2 maximum input		Factory default value	10.00V
	Setup range	F2-14 to 10.00V		
F2-17	AI2 maximum input corresponding setup mode		Factory default value	0
	Setup range	0	F2-18	
		1	Set by AI1	

F2-18	Corresponding setup of AI2 maximum input		Factory default value	100.0%
	Setup range	-100.0% to 100.0%		
F2-19	AI2 input filtering time		Factory default value	0.10s
	Setup range	0.00s to 10.00s		

AI2 is similar to AI1 in terms of setup method.

When AI2 channel is analog current input, if the input current is 0mA to 20mA, the corresponding input voltage is 0V to 10V. If the input current is 4mA to 20mA, 4mA current corresponds to 2V voltage; if it needs to make 4mA to 20mA correspond to 0% to 100%, it can set the voltage to 2V to 10V accordingly.

Caution: F2-11 and F2-17 cannot be selected as 1 at the same time, or the corresponding setups of AI1 and AI2 will conflict and fail.

F2-20	PULSE input minimum frequency		Factory default value	0.00 kHz
	Setup range		0.00kHz to F2-22	
F2-21	Corresponding setup of PULSE input minimum frequency		Factory default value	0.0%
	Setup range		-100.0% to 100.0%	
F2-22	PULSE input maximum frequency		Factory default value	50.00 kHz
	Setup range		F2-20 to 50.00kHz	
F2-23	PULSE input maximum frequency corresponding setup		Factory default value	0
	Setup range	0	F2-24	
		1	Set by AI1	
		2	Set by AI2	

F2-24	Corresponding setup of PULSE input maximum frequency		Factory default value	100.0%
	Setup range	-100.0% to 100.0%		
F2-25	PULSE input filtering time		Factory default value	0.10s
	Setup range	0.00s to 10.00s		

This parameter defines the relationship between the pulse input and the typical setup value of pulse input when the input pulse is used as frequency source. PULSE is similar to AI in terms of setup method.

When the frequency source is “PULSE reference (DI5), pulse reference can only be input via the multifunctional input terminal DI5 and DI5 is pulse frequency input function terminal by default and other settings are not required.

Caution: The “PULSE setup (DI5)” function of the frequency source (F0-01) and the “FMP pulse output” function of the FM terminal (F3-00) cannot be selected for use at the same time.

F2-26	DI input terminal valid state selection	Factory default value	0
	Setup range	0 to 31	

Set the valid state of DI input terminal by bits.

0: positive logic (Valid connected)

1: antilogical (Invalid disconnected)

The corresponding relationship between BIT and DI is shown as the following table.

Others	BIT4	BIT3	BIT2	BIT1	BIT0
Reserved	DI5	DI4	DI3	DI2	DI1

Set a DI for anti-logic (valid disconnected), the corresponding BIT should be set to 1, then this binary number is converted to decimal code at this function code.

F2-27	AI1 is used as the function selection of DI6	Factory default value	0
	Setup range	The same as F2-00	
F2-28	**AI2 is used as the function selection of DI7**	Factory default value	0
	Setup range	The same as F2-00	

AI is used as DI, but the ground of AI (GND) and DI (COM) are not to breakover.

Group F3 Output Terminal

MD280 series inverter provides one multifunctional terminal output selection (FMP, AO or DO3), one multifunctional relay output terminal (RELAY) and two multifunctional digital output terminal (DO1 and DO2).

FM and AO terminals are two different types of signal output terminals in the same channel and cannot be used at the same time. FM terminal has two-type of functions and can select output PULSE signal (FMP) or digital signal (DO3). The output signal type can be selected via F3-00.
Remark: FMP pulse signal and DO3 digital signal are all output via FM terminal.

F3-00	Multifunctional terminal output selection		Factory default value	2
	Setup range	0	FM (FMP pulse output)	
		1	FM (DO3 digital output)	
		2	AO (Analog output)	

Caution: The “PULSE setup (DI5)” function of the frequency source (F0-01) and the “FMP pulse output” function of the FM terminal (F3-00) cannot be selected for use at the same time.

F3-01	RELAY output selection	Factory default value	2 (Fault output)
F3-02	DO1 output selection	Factory default value	1(Inverter being running)
F3-03	DO2 output selection	Factory default value	4(Frequency arrival)

F3-04		Factory default value	0 (No output)

RELAY refers to relay output terminal TA/TB/TC, in which TA is common terminal of relay output, TB is the normally closed output terminal and TC is the normally open terminal.

F3-01 to F3-04 function selections are as follows:

Setup value	Function	Description
0	No output	The output terminals do not have any function.
1	Inverter running	When the inverter is running, ON signal is output.
2	Fault output	When the inverter has fault, ON signal is output Caution: It do not output ON signal upon under-voltage.
3	Frequency level detection FDT arrival	Refer to F5-15 and F5-16 function codes for the detailed descriptions.
4	Frequency arrival	Refer to F5-17 function code for the detailed descriptions.
5	Frequency upper limit arrival	When the operating frequency of the inverter reaches the frequency upper limit, it outputs ON signal.
6	Frequency lower limit arrival	When the operating frequency of the inverter reaches the frequency lower limit, it outputs ON signal.
7	Running at zero speed	When the inverter stops or is running, it outputs ON signal.
8	Motor overload pre-alarm	Judgment will be made according to the prealarm parameter value before the motor electronic thermal protection is enabled. If it exceeds the prealarm parameter value, ON signal will be output. Refer to FB-00 to FB-02 function codes for the descriptions of motor overload.
9	Inverter overload pre-alarm	When it is found that the inverter is overloaded, ON signal will be output before the overload protection occurs.
10	Setup counting pulse value arrival	When the counting value reaches the frequency upper limit, it outputs ON signal.
11	Designated	When the actual length exceeds the setup value in

Setup value	Function	Description
	counting pulse value arrival	F7-05, it outputs ON signal. Refer to F7-08 and F7-09 function codes for the description of length counting function.
12	Length arrival	When the actual length exceeds the setup value in F7-05, it outputs ON signal. Refer to F7-08 and F7-09 function codes for the description of length counting function.
13	PLC circulation end	When the simple PLC running finishes one circulation, it output a pulse signal with width of 250ms.
14	Run time reached	When the accumulated running time (F7-12) of the inverter exceeds the setup time (F5-12), it outputs ON signal. Refer to F5-12 and F5-13 function codes for the description of timing function.
15	Communication control	It is controlled by the host computer. Refer to MD280 Series Communication Protocol for details.
16	RUN ready	When the inverter has no fault and the bus voltage works normally and the inverter is ready for running, it outputs ON signal. Upon normal startup, it closes the output.
17	AI1>AI2	When the voltage value of analog input AI1 is higher than that of analog input AI2, it output ON signal.
18	Zero-current is detected	When the zero-current is detected, it output ON signal.
19	External brake signal	Refer to F5-39 and F5-40.
20	Software over-curent DO output	Refer to F5-27.

F3-05	FMP and AO output selection	Factory default value	0

The standard output (zero offset is 0 and gain is 1) of the analog output is 0 to 20mA (or 0V to 10V, and the FMP output range is between 0Hz and setup value of function code F3-08.

The corresponding value range is as shown in the table below:

Setup value	Function	Range
0	Running frequency	0 to maximum output frequency (F0-04 setup value)
1	Setup frequency	0 to maximum output frequency (F0-04 setup value)
2	Output Current	0 to 200% of the rated current of the inverter
3	Output power	0 to 200% of the rated power of the inverter
4	PULSE input	1Hz to 50.0kHz
5	AI1	0V to 10V
6	AI2	0V～10V/0～20mA
7	Length	0 to setup length value (setup value of F7-05)
8	Counting value	0 to setup counting value (setup value of F7-08)
9	Communication control output	(Refer to MD280 Serial Communication Protocol for details.)

F3-06	**Zero offset**		Factory default value	0.0%
	Setup range	-100.0% to 100.0%		
F3-07	**AO gain**		Factory default value	1.00
	Setup range	-10.00 to 10.00		

AO standard output means to output 0 to 0V or (0mA to 20mA), and the corresponding analog output is 0 to maximum.

AO zero offset coefficient and gain are generally used to modify the zero drift of the analog output and can also be used to modify the standard output as analog output value corresponding to any required curve.

If b represents zero offset, k represents k, Y represents actual output, and X represents standard output, the actual output is calculated as follows:

$$Y=kX+b$$

AO zero offset coefficient 100% corresponds to 10V (20mA).

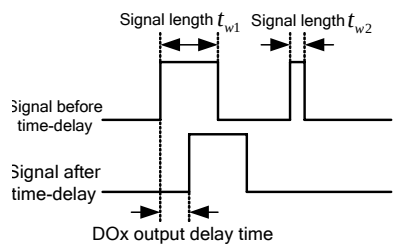
For example, if the analog output is the running frequency, and it is expected to output 8V (16mA) when the frequency is 0, and output 3V (6mA) at the maximum frequency, the standard output 0V to 10V shall be modified to 8V to 3V output. As per the above formula, AO zero offset coefficient shall be set to “80%”, while A0 gain shall be set to “-0.50”.

F3-08	**Maximum frequency of FMP output**	Factory default value	50.0kHz
	Setup range	0.1kHz to 50.0kHz	

When the multifunctional terminal output function (F3-00) selects FMP pulse output, it can set the maximum frequency value of output pulse.

F3-09	**RELAY output delay time**	Factory default value	0.0s
F3-10	**DO1 output delay time**	Factory default value	0.0s
F3-11	**DO2 output delay time**	Factory default value	0.0s
F3-12	**DO3 output delay time**	Factory default value	0.0s
	Setup range	0.0s to 3600.0s	

These functions mean that DOx signal (including RELAY) to maintain a valid pulse hold time, as shown in Figure 6-10. Only when DOx signal is greater than the width of the function code in order to be identified, t_{w1} in the diagram can be identified, t_{w2} is ignored.



Schematic Diagram for DOx output delay time

F3-13	DO output terminal valid state selection	Factory default value	0
	Setup range	0 to 15	

Set the valid state of DI input terminal by bits.

0: Positive logic (Valid connected)

1: Antilogical (Invalid disconnected)

The corresponding relationship between BIT and DI is shown as the following table:

Others	BIT2	BIT2	BIT1	BIT0
Reserved	DO3	DO2	DO1	RELAY

Set a DI for anti-logic (valid disconnected), the corresponding BIT shoule be set to 1, then this binary number is converted to decimal code at this function code.

Group F4 Start/Stop Control

F4-00	**Startup mode**		Factory default value	0
	Setup value	0	Direct startup (When the DC brake time is non-zero value, it can perform DC brake before start.)	
		1	Rotation velocity tracking startup	

0: Direct startup:

When the DC brake time is zero, it starts at the startup frequency.

When the DC brake time is non-zero value, it can perform DC brake before start. It is suitable for the applications where small inertia may cause reverse rotation at the time of startup.

1: Rotation velocity tracking startup: The inverter firstly judges the rotation velocity and direction of the motor and then starts at the frequency corresponding to the tracked rotation velocity of the motor, and performs smooth startup of the motor in rotation without impact.

It is suitable for the applications where large inertia is restarted due to transient power shutdown.

In order to ensure the performance of the rotation velocity tracking startup, it needs set the motor parameters (Group F1) correctly.

F4-01	Rotation speed tracking mode		Factory default value	0
	Setup range	0	Start from stop frequency	
		1	Start from zero speed	
		2	Start from maximum frequency	

In order to complete the rotation speed tracking process in the shortest period, it can select the mode of inverter tracking the rotation velocity of motor:

0: Track downward from the frequency at the time of stop, which is generally selected at first.

1: Track upward from zero frequency, which is used when the inverter is restarted upon long period of power shutdown.

2: Track downward from the maximum frequency, which is generally used for power generating load.

F4-02	Rotation velocity tracking fastness and slowness	Factory default value	20
	Setup range	1 to 100	

When it is in the mode of rotation speed tracking startup, it is used select the fastness and slowness of tracking the rotation speed. The higher the parameter value is, the faster the tracking velocity is, but too higher value may cause unreliable tracking.

F4-03	Startup frequency	Factory default value	0.00Hz
	Setup range	0.00Hz to maximum frequency （F0-04）	
F4-04	Startup frequency retention time	Factory default value	0.0s
	Setup range	0.0s to 36.0s	

To ensure the torque at the time of startup proper startup frequency shall be set. In addition, in order to set up magnetic flux when waiting for the startup of the motor, the startup frequency shall remain for a certain period of time before accelerating to the setup frequency, as shown in Fig.6-10.

If the frequency reference value (frequency source) is lower than the startup frequency, the inverter cannot start and will be in standby status.

Example 1:

F0-01=0 means the frequency source is digital reference.

F0-03＝10.00Hz means the digital setup frequency is 10.00Hz.

F4-03＝5.00Hz means the startup frequency is 5.00Hz.

F4-04＝2.0s means that the startup frequency retention time is 2.0s.

In this case, the inverter will be in the standby status and its output frequency is 0Hz.

Example 2:

F0-01=0 means the frequency source is digital reference.

F0-03＝10.00Hz means the digital setup frequency is 10.00Hz.

F4-03＝5.00Hz means the startup frequency is 5.00Hz.

F4-04＝2.0s means that the startup frequency retention time is 2.0s.

In this case, the inverter directly starts at 5Hz and remains for 2 seconds, and then accelerates to the setup frequency 10Hz.

Caution:

1) The startup frequency and retention time is not limited by the frequency lower limit.

2) The retention time is not included in the acceleration time.

3) At the time of switching between forward and reverse rotations, the startup frequency and retention time has no action.

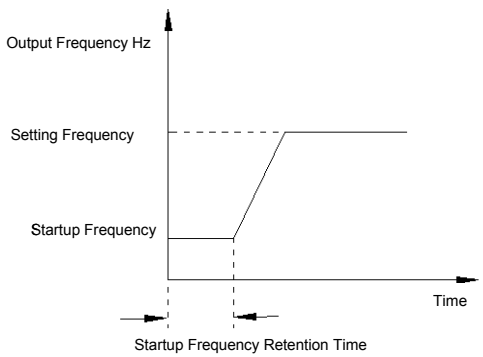


Fig 6- 11 Schematic Diagram for Startup Frequency and Startup Retention Time

F4-05	DC brake current at startup	Factory default value	0%
	Setup range	0% to 100%	
F4-06	DC brake time at startup	Factory default value	0.0s
	Setup range	0.0s to 36.0s	

The DC brake at startup is generally used when the motor is restarted upon stopping completely.

If the startup mode is direct startup, it will firstly perform DC brake with the DC brake current at startup and then start running after the period of DC

brake time at startup as set, as shown in Fig.6-12.

DC brake current at startup: The DC brake quantity added shall be set according to the percentage setting of the rated current of the inverter. The higher the brake current is, more powerful the brake effect is.

DC brake time at startup: It refers to the continuous DC brake time. If it is set to 0, the inverter will be started directly without undergoing DC brake.

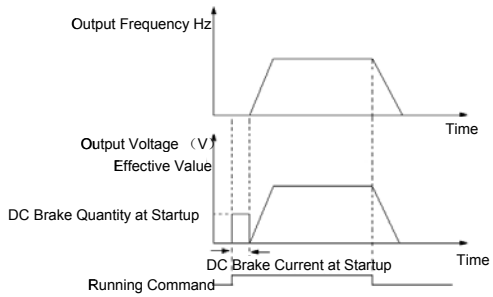


Fig6-13 Schematic Diagram for Brake Current at Startup

F4-07	**Speed-up/speed-down mode**	Factory default value	0
	Setup range	0	Straight speed-up/speed-down
		1	S curve speed-up/speed-down mode A
		2	S curve speed-up/speed-down mode B

It is used to select the frequency change mode during the inverter start and stop process.

MD280 series inverter provides two types of speed-up/speed-down times,

0: Straight speed-up/speed-down

The output frequency increases or decreases along the straight line. It can select speed-up/speed-down time via the multifunctional digital input terminals

1：S-curve speed-up/speed-down A

The output frequency increases or decreases along the straight line. S curve is generally used in the applications where start and stop processes are relatively flat, such as elevator and conveyor belt.As shown in Fig.6 .The speed-up/speed-down time is consistent with the straight speed-up/speed-down time.Function code of F4-08 and F4-09 can be respectively defined the time proportion between the S-curve starting-segment and finishing-segment for S-curve speed-up/speed-down A.

2： S-curve speed-up/speed-down B

In the speed-up/speed-down curve, the motor rated frequency f_b is always the point of inflexion on S-curve.As shown in 6-14. S curve is generally used in the applications where the high-speed area above the rated frequency and short-time speed-up/speed-down.

When setup frequency is above the rated frequency, speed-up/speed-down time is:

$$t = (\frac{4}{9} \times (\frac{f}{f_b})^2 + \frac{5}{9}) \times T$$

.

Where,

f Refers to setup frequency,

f_b Refers to motor rated frequency,

T Refers to the time speed-up from 0 to rated frequency f_b

F4-08	Initial -segment time of S-curve	Factory default value	20.0%
	Setup value	0.0% to 100.0%	
F4-09	Finishing-segment time of S-curve	Factory default value	20.0%
	Setup value	0.0% to 100.0%	

Function code of F4-08 and F4-09 can be respectively defined the time proportion between the S-curve initial-segment and finishing-segment for S-curve speed-up/speed-down A.And they meet the standard of F4-08 + F4-09 ≤ 100.0%.

t1 in the Fig.6-13 is the parameters defined by F4-08, in this period of time which the changing slope of output frequency is larger and larger. t2 is in the Fig.6-13 is the parameters defined by F4-09, in this period of time which the changing slope of output frequency change to zero. The changing slope of output frequency is fixing within the time of t1 and t2.

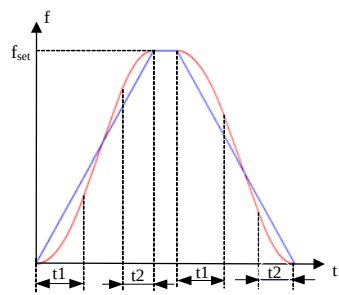


Fig.6-13 Schematic Diagram for speed-up/speed-down A of S-curve

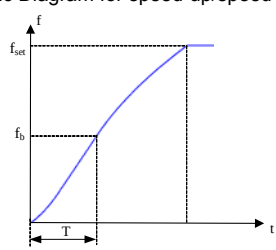


Fig.6-14 Schematic Diagram for speed-up/speed-down A of S-curve

F4-10	Stop mode	Factory default value		0
	Setup range	0	Speed-down to stop	
		1	Free stop	

0: Speed-down to stop

When the stop command is valid, the inverter will decelerate to stop according to the setup deceleration time.

1: Free stop

When the stop command is valid, the inverter will terminate the output immediately and the load will coast to stop according to the mechanical inertia.

F4-11	DC brake initial frequency at stop	Factory default value	0.00Hz
	Setup range	0.00Hz to maximum frequency	
F4-12	DC brake waiting time at stop	Factory default value	0.0s
	Setup range	0.0s to 36.0s	
F4-13	DC brake current at stop	Factory default value	0%
	Setup range	0% to 100%	
F4-14	DC brake time at stop	Factory default value	0.0s
	Setup range	0.0s to 36.0s	

DC brake initial frequency at stop: During the process of decelerating to stop, when the running frequency at stop reaches this frequency, it will start the process of DC brake at stop.

DC brake waiting time at stop: Prior to the beginning of DC brake at stop, the inverter will terminate the output, and then start DC brake after this delay time. It is used to prevent over current fault due to DC brake which starts at the time of higher velocity.

DC brake current at stop: The DC brake quantity added shall be set according to the percentage setting of the rated current of the inverter. The higher the brake current is, more powerful the brake effect is.

DC brake time at stop: It refers to the continuous DC brake time. If this DC brake time is set to 0, it indicates that there is no DC brake process, and the inverter will stop according to the set process of decelerating to stop.

DC brake at stop function must be enabled by the external terminal DI. Refer to “DC Brake at Stop Enable” function of input terminal in Group F2 for details.

The process of DC brake at stop is as shown in Fig.6-15:

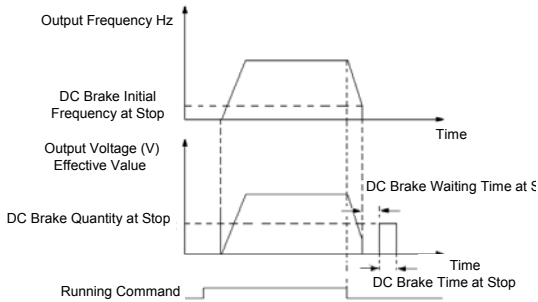


Fig.6-15 Schematic Diagram for DC Brake at Stop

F4-15	Brake utilization ratio	Factory default value	100%
	Setup range	0% to 100%	

It is valid for the inverter with built-in brake unit. It can be used to adjust the brake effect of the brake unit.

Group F5 Auxiliary Function

F5-00	Jog running frequency		Factory default value	2.00Hz
	Setup range	0.00Hz to maximum frequency (F0-04)		
F5-01	Jog speed-up time		Factory default value	20.00s
	Setup range	0.00s to 300.00s		
F5-02	Jog speed-down time		Factory default value	20.00s
	Setup range	0.00s to 300.00s		

It defines the reference frequency and speed-up/speed-down time of the inverter at the time of jogging. The jog process is started and stopped according to the startup mode 0 (F4-00, direct startup) and stop mode 0 (F4-10, decelerate to stop).

The jog speed-up time refers to the time required for accelerating 0Hz to the maximum output frequency (F0-04), and jog deceleration time refers to the time required for the inverter to decelerate from the maximum output frequency (F0-04) to 0Hz.

No matter what the command source (F0-00) is set, the forward jog and reverse jog functions are all valid.

Caution:

1) Jog running frequency is not limited by frequency lower.
2) Jog running frequency is not limited by skip frequency.

F5-03	Jog enabled during operation		Factory default value	0
	Setup range	0	Disabled	
		1	Abled	

It is used to set whether the jog is allowed during the operation.

If the jog enable during the operation is valid, the inverter will execute the jog running command firstly and return to the operating status prior to jog running upon completion of execution of the jog command.

Caution:

1) The jog function is invalid during the DC brake process.
2) If jog is executed during the PLC running process, it will memorize the running phase when jog occurs and the time that has been running at this phase. Upon completion of jog, it will restore to

the running phase as memorized by PLC and continue to run for the remaining time in this phase.

F5-04	Speed-up time 2	Factory default value	20.00 s (m)
	Setup range	0.0s(m) to 300.00s(m)	
F5-05	Speed-down time 2	Factory default value	20.00 s (m)
	Setup range	0.0s(m) to 300.00s(m)	

Its meaning is identical with speed-up/speed-down time 1 (F0-09 and F0-10). Refer to the descriptions of F0-09 and F0-10 function codes for details.

It can select speed-up/speed-down time 1 or speed-up/speed-down time 2 through the external digital input terminal DI. Refer to the function description of “Speed-up/Speed-down.Selection Terminal” of function codes of Group F2-00 to F2-04 for details.

F5-06	Skip frequency	Factory default value	0.00Hz
	Setup range	0.00Hz to maximum frequency (F0-04)	
F5-07	Skip frequency amplitude	Factory default value	0.00Hz
	Setup range	0.00Hz to maximum frequency (F0-04)	

It can make the inverter run away from the mechanical resonance point by setting the skip frequency.

The inverter cannot run at the frequency point within the skip frequency range. If the setup frequency is within the skip frequency range, the actual running frequency will run at the boundary of the skip frequency, as shown in Fig.6-13.

One skip frequency point can be set for this inverter. If the skip amplitude is set to 0, this function has no action.

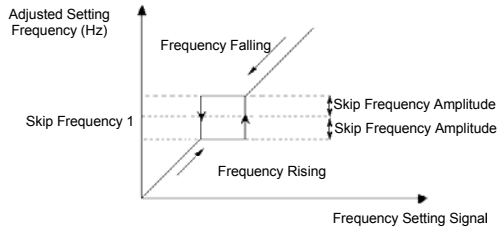


Fig 6-16 Schematic Diagram for Skip Frequency

F5-08	Dead zone time of Forward and reverse rotations	Factory default value	0.00s
	Setup value	0.0s to100.0s	

It refers to the transit time at the zero frequency output point when the inverter switches between forward rotation and reverse rotation. The dead zone time is as shown in Fig.6-13:

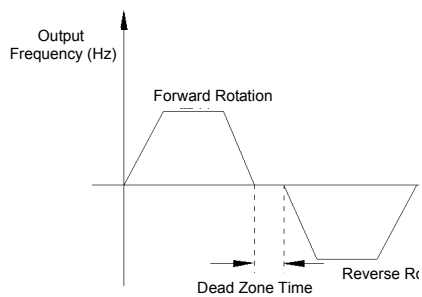


Fig 6-17 Schematic Diagram for Dead Zone Time of Forward and Reverse rotations

F5-09	Reverse rotation control		Factory default value	0
	Setup value	0	Reverse rotation enabled	
		1	Reverse rotation disabled	

0: Reverse rotation enabled: It can control the reverse rotation of the inverter through the keyboard, terminals or communications.

1: Reverse rotation disabled: The reverse rotation control function is invalid when the inverter is under control of keyboard, terminals or communications.

Remark: Reverse rotation control disabled is valid for the jog running of the inverter.

F5-10	Run with frequency below frequency lower limit		Factory default value	0
	Setup range	0	Run with frequency lower limit	
		1	Delay to stop	

It is used to select the running status of the inverter when the setup frequency is lower than the frequency lower limit.

0: Running with frequency lower limit: If the setup frequency is lower than the frequency lower limit, the inverter will run with the frequency lower limit.

1: Stop: If the setup frequency is lower than the frequency lower limit during the inverter running process, the inverter will stop. If the setup frequency is lower than the frequency lower limit at the time of startup, the inverter will not start.

In order to prevent the motor from running at low speed for long period of time, it can use this function to stop the unit.

F5-11	Delay duration of stop with frequency below frequency lower limit	Factory default value	0.0s
	Setup range	0.0s to 3600.0s	

It refers to the delay duration from the time when the delay stop is set for the setup frequency lower than the frequency lower limit (F5-10) to the time when the frequency is lower than the frequency lower limit.

F5-12	Setup running time		Factory default value	0h
	Setup range	0h	Invalid	
		1h to 65535h	Valid	

It is used to set the time for the inverter to perform timing running. If the running time is set to 0, this function is invalid.

When the accumulated running time (F7-12) reaches this set running time, the digital output terminal DO outputs the signal of running time arrival. Refer to the description of “Running Time Arrival” of DO output terminal in Group F3.

Remark: If it does not perform timing running, please set the “Setup Running Time” to 0.

F5-13	Action selection at the arrival of running time		Factory default value	0
	Setup range	0: Continue to run		
		1： Stop		

It is the action performed by the inverter when the accumulated running time (F7-12) reaches the setup running time (F5-12).

If the accumulated running time is larger or equal to the setup running time and the running time arrival action is selected as “Stop”, the inverter will report ERR26 fault, indicating that the running time is reached and the inverter cannot start running. This fault cannot be reset and the inverter cannot run until setting is performed according to the following three ways:

1) Select the running time arrival action as “Continue to run”.
2) Set the setup running time (F5-12) to “0h” and cancel the timing function.
3) If timing remains, set the setup running time (F5-12) to a timing duration that is higher than the accumulated running time (F7-12).

Caution: If it does not perform timing running, please set this parameter value to “Continue to Run”.

F5-14	Startup protection selection			Factory default value	0
	Setup range	0	Valid		
		1	Invalid		

This parameter is used to improve the safety protection coefficient. If it is set to 1, it has two functions:

1) The running command exists upon power-on of the inverter. It must cancel the running command to eliminate the running protection status.

2) If the running command still exists when the inverter fault is reset, it must cancel the running command to eliminate the running protection status.

This can prevent the dangers caused by the automatic running of the motor under unexpected condition.

F5-15	Frequency detection value		Factory default value	50.00Hz
	Setup range	0.00Hz to maximum frequency (F0-04)		
F5-16	Frequency detection hysteresis value (FDT hysteresis)		Factory default value	5.0%
	Setup range	0.0 to 100.0%(FDT level)		

It is used to set the detection value of the output frequency and the hysteresis value upon release of the output action.

When the inverter running output frequency reaches FDT (F5-15), DO or relay outputs frequency detection arrival signal till the output frequency falls below a certain frequency of FDT level (FDT level-F5-15×F5-16), as shown in Fig.6-5:

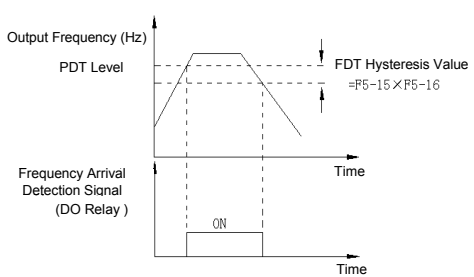


Fig.6-18 Schematic Diagram for FDT Level Detection

F5-17	Frequency arrival detection amplitude	Factory default value	0.0%
	Setup range	0.00 to 100% (maximum frequency F0-04)	

This parameter is supplementary note to No.4 function (frequency arrival) of DO output in Group F3.

When the output frequency of the inverter reaches the set frequency value, this parameter can be used to adjust the detection amplitude, when the output frequency of the inverter is in the detected width of positive and negative amplitudes of the setup frequency, it outputs ON signal, as shown in Fig.6-19:

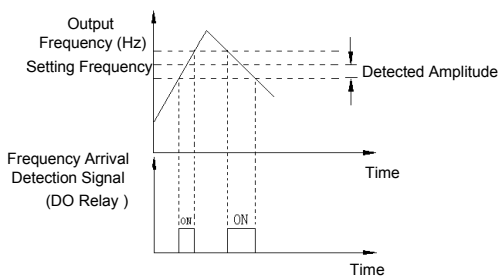


Fig 6-19 Schematic Diagram for Detected Amplitude of Frequency Arrival

F5-18	Random PWM gain	Factory default value	0
	Setup range	0 to 10	

Set the random PWM gain, monotonous and harsh electromagnetic noise can be changed to the heterogeneous and soft noise, the external electromagnetic interference can be effectively reduced. 0 indicats that the gain is zero, the largest gain is ten.

F5-19	Modulation mode seletion		Factory default value 0
	Setup range	0	Asynchronous modulation
		1	Synchronous modulation

In the medium-frequency-motor situation, choose the synchronous modulation mode to make the output current waveform more stable, more symmetrical as well as the three-phase current. In the synchronous modulation mode, the current ripple and electromagnetic noise will be smaller, but the switching frequency fault increases.

The synchronous modulation mode can be enabled only after the operating

frequency which is higher than 85Hz.

F5-20	**Fast current limit function selection**		Factory default value	1
	Setup range	0	Invalid	
		1	Valid	

Enable the fast current-limit function so as to minimize inverter overcurrent protection fault and make the inverter work normally.

When entering the fast current-limiting state to continue for some time, will report fast-limit overtime fault (Err40), which indicates the inverter is overload, and refer to the process of Err10.

Caution:

Please do not use this function for the hoist type of load, other load is recommend to use this function.

F5-21	Wake-up frequency	Factory default value	0.00Hz
	Setup range	Sleep frequency to maximum frequency（F0-04）	
F5-22	Wake-up delay time	Factory default value	0.0s
	Setup range	0.0s to 6500.0s	
F5-23	Sleepfrequency	Factory default value	0.00Hz
	Setup range	0.00Hz to wake-up frequency（F5-21）	
F5-24	Sleep delay frequency	Factory default value	0.0s
	Setup range	0.0s to 6500.0s	

This function can achieve the sleep and wake-up function. After the running the command, if it is in Sleep state when the setup frequency is not less than F5-21 (frequency), and then the inverter begins to start after the wake-up delay time of F5-22.During the operation, when the setup frequency is not more than F5 -23 (Sleep frequency), and then the inverter stops after the wake-up delay time of F5-24.Set F5-21 (wake-up frequencies) and 5-23 (Sleep frequency) to 0, which indicates that the Sleep and wake-up is invalid.

Caution:

When use the Sleep function, please ensure whether to operate the function code of F6-10(PID operation mode) when stopping.

F5-25	**Software over-current point**		Factory default value	200.0%
	Setup value	0.0% to 300.0%（motor rated current）		
F5-26	Software over-current detection delay time		Factory default value	0.00s
	Setup value	0.00s（No detection） 0.01s to 600.00s		

When the current exceed the software over-current point（F5-25）,and the continuous time arrive the software over-current detection delay time (F5-26), the reported fault ERR31 (software over-current fault)

F5-37	Dead-zone compensation mode selection	Factory default value	0
	Setup range	0 to 1	

Pompt: Use mode of 0 below 200Hz, otherwise use mode 1.

F5-38	**Cooling fan control**	Factory default value	0
	Setup range	0	Cooling fan runs at motor operation
		1	Cooling fan runs after power-on

Group F6 Process Control PID Function Parameters

PID control is a common method used in process control. Through the proportional, integral and differential calculation on the differences between feedback signal of the controlled parameter and signal of the target parameter, PID control adjusts the output frequency of the inverter and forms negative feedback system, making the controlled parameter stabilized on the target parameter. PID control applies several process controls such as flow control, pressure control and temperature control.The schematic diagram for control is as shown in Fig. 6-20.

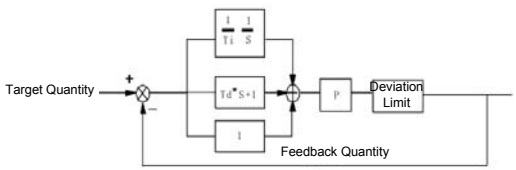


Fig.6-20 Schematic Diagram for Process PID

F6-00	PID reference source		Factory default value	0
	Set up value	0	F6-01	
		1	AI1	
		2	AI2	
		3	PULSE (DI5)	
		4	MS speed	

It is used to select target parameter reference channel of process PID.

If the set target value of process PID is a relative value, 100% of the set value corresponds to 100% of the feedback signal of controlled system.

Caution:

When F6-00 is selected to 4(MS speed), F8-00 (MS speed 0 reference mode is not selected to 4.

F6-01	**PID numerical value reference**	Factory default value	50.0%
	Setup range	0.0% to 100.0%	

This parameter needs to be set when F6-00 is set as 0.

Reference value of this parameter is the feedback value from the system.

F6-02	PID reference change duration		Factuory default value	0.0s
	Setup range	0.0s to 3000.0s		

PID reference changes according to this parameter value, which corresponds to the time taken for the PID reference to change from 0% to 100%.

F6-03	**PID feedback source**		Factory default value	0
	Setup value	0	AI1	
		1	AI2	
		2	PULSE（DI5）	
		3	AI1-AI2	

It is used to select the feedback channel of PID.

F6-04	**PID action direction**		Factory default value	0
	Setup value	0	Positive action	
		1	Negative action	

Positive action: If the feedback signal is smaller than the PID reference signal, it is required to boost the output frequency of the inverter to make PID reach balance. The winding tension PID control is such a case.
Negative action: If the feedback signal is smaller than the PID reference signal, it is required to decrease the output frequency of the inverter to make PID reach balance.
The unwind tension PID control is such a case.

F6-05	PID reference feedback range		Factory default value	1000
	Setup range	0 to 65535		

PID reference feedback range is a dimensionless unit which is only used to the value that displays PID reference and feedback currently.
For example, if the parameter is set as 1000, the range 0%- 100% for PID reference and feedback is linear correspondence with 0-1000.

F6-06	**Proportional gain P**	Factory default value	20.0

	Setup range	0.0 to 100.0	
F6-07	**Integral time I**	Factory default value	2.00s
	Setup range	0.01s to 10.00s	
F6-08	**Differential time D**	Factory default value	0.000s
	Setup range	0.000s to 10.000s	

Proportional gain P: the parameter determines the adjustable strength of PID regulator. The larger P is, the greater the adjustable strength will be.When the parameter is set as 100, it means that when the deviation between PID feedback value and reference value is 100%, the range for the PID regulator to regulate the output frequency commands is the maximum frequency (integral effect and differential effect are omitted).

Integral time I: determines the speed at which PID regulator integrates the derivation between PID feedback value and reference value.Integral time means that when the derivation between PID feedback value and reference value is 100%, the adjustment by the integral regulator (proportional effect and differential effect are omitted) after continuous adjustment in this period reaches the maximum frequency (F0-09).The shorter integral time is, the greater the regulating strength will be.

Differential time D: It determines the degree of adjustment that PID regulator performs on the derivation between PID feedback value and reference value.Differential time means that if the feedback value changes 100% within this time, the adjustment by the integral regulator (proportional effect and differential effect are omitted) will reach the maximum frequency (F0-09).The shorter differential time is, the higher the degree of adjustment will be.

F6-09	**Deviation limit**	Factory default value	0.0%
	Setup value	0.0% to 100.0%	

It is used to set the maximum allowable deviation between the system feedback value and reference value. When the deviation between the PID feedback and reference is within this range, the PID stops adjustment. The deviation limit is calculated according to the percentage of the PID setup source (or feedback source).

Setting this function properly will help to focus on the system output precision and stability.
The deviation limit description is as shown in Fig. 6-21:

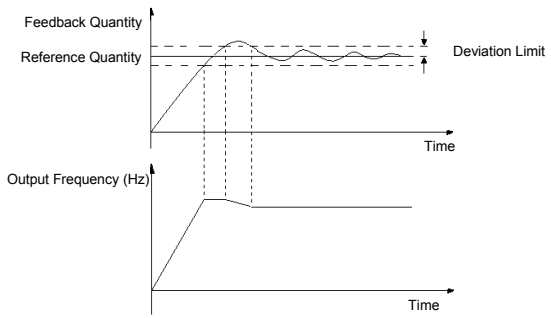


Fig.6-21 Schematic Diagram for Deviation Limit

F6-10	**PID operation mode**	Factory default value	0
	Setup range	0	NO operation at stop
		1	Operation at stop

F6-11	PID cutoff frequency of reverse rotation	Factory default value	0.00Hz
	Setup range	0.00Hz to maximum frequency	

When in the PID adjustment, running frequency of the adjustment can be reversed to run to the cutoff frequency of reverse rotation.

Group F7 Swing Frequency, Fixed Length and Counting

The swing frequency function is applicable to textile and chemical fiber industries and applications where traversing and winding functions are required.

Swing frequency means that the inverter output frequency swings up and down with the setup frequency (frequency command is selected in F0-01) as the center, and the trace of running frequency at the time axis is as shown in Fig.6-22.The swing amplitude is set in F7-00 and F7-01.

When F7-01 is set to 0, meaning the swing amplitude is 0, or F7-03 is set to 0, the swing frequency will have no function.

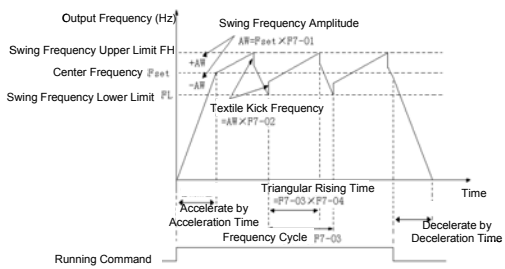


Fig. 6-18 Schematic Diagram for Swing Frequency

F7-00	Swing frequency setup mode		Factory default value	0
	Setup range	0	Relative to the center frequency	
		1	Relative to the maximum frequency	

It is used to determine the amplitude value.

0: Relative to the center frequency (F0-03 frequency source selection): It is a variable swing amplitude system, with the swing amplitude changing with the center frequency (setup frequency).

1: Relative to the maximum frequency (F0-04 maximum output frequency): It is a fixed swing amplitude system, with fixed swing amplitude that is calculated by the maximum frequency.

F7-01	Wing frequency amplitude	Factory default value	0.0%
	Setup range	0.0% to 100.0%	
F7-02	Kick frequency amplitude	Factory default value	0.0%
	Setup range	0.0% to 50.0%	

It is used to determine the amplitude value and the kick frequency value.
Swing relative to the center frequency (variable swing, select F7-00 as 0): Swing (AW) =frequency source F0-01 setup times swing amplitude F7-01.
Swing relative to the maximum frequency (fixed swing, select F7-00 as 1): Swing (AW) = maximum frequency F0-04 times swing amplitude F7-01.
When the swing is running, the kick frequency relative to the swing= Swing (AW) times kick frequency amplitude F7-02.
If “Swing relative to the center frequency (variable swing amplitude, select F7-00 as 0)” is selected, the kick frequency is variable value.
If “Swing relative to the maximum frequency (fixed swing, select F7-00 as 1)” is selected, the kick frequency is fixed value.

F7-03	Swing frequency cycle	Factory default value	10.0s
	Setup range	0.0s to 3000.0.0s	
F7-04	Triangle wave boost coefficient	Factory default value	50.0%
	Setup range	0.0% to 100.0%	

Swing frequency cycle: It defines the time of a whole cycle for rising and falling of the swing frequency.
The triangle wave rising and falling time is as shown in Fig.6-22:
Triangle wave rising time= Swing frequency cycle F7-03 times triangle wave rising time coefficient F7-04 (unit: s)
Triangle wave falling time= Swing frequency cycle F7-03 times (1-triangle wave rising time coefficient F7-04) (unit: s)
Remark: When the inverter is running with swing frequency, if the center frequency changes, it stops swinging until the inverter running from the current center frequency to the changed center frequency.

Caution: When the inverter is running with swing frequency, if the center frequency changes, it stops swinging until the inverter running from the current center frequency to the changed center frequency.

F7-05	Setup length	Factory defalult value	1000m
	Setup range	0m to 65535m	
F7-06	Actual length	Factory defalult value	0m
	Setup range	0m to 65535m	
F7-07	Number of pulses per meter	Factory defalult value	100.0
	Setup range	0.1 to 6553.5	

The three parameters such as setup length, actual length and number of pulses per meter are mainly used for fixed-length control.
The length is calculated through the pulse signal input via the input terminal DI, and it needs to set the corresponding input terminal to length counting input terminal. It generally needs to use DI5 terminal input when the pulse frequency is relatively higher.

Actual length (F7-06) is used for storing the length value calculated. Before calculating the length, it can modify this parameter value as the initial value of length calculation, and the actual length is added on the basis of this initial value, and the actual length calculated will be stored upon power-off.

Actual length =initial value of length calculation plus number of length counting input pulses/number of pulses per meter.

When the actual length (F-06) exceeds the setup length (F7-05), it outputs “Length Arrival” signal via the digital output terminal “DO terminal”.
It can perform length reset operation by setting the external input terminal to “Length Counting Reset” function.

Caution: The current length counting value can be timely viewed via the stop or running display parameter. Refer to F7-13 and F7-14 function codes for details.

F7-08	**Setup counting value**	Factory default value	1000
	Setup range	1 to 65535	
F7-09	Designated counting value	Factory default value	1000
	Setup range	1 to 65535	

The counting value is input to the pulse signal counting (one number for one pulse) via the “Counter Input” terminal in the DI terminal. When the counting is reached, it is output to the counting arrival signal via the DO output terminal, and the counting value of the counter will be stored upon power-off.

When the counting value reaches the setup counting value, the digital output terminal will output setup counting value arrival signal, and the counter will continue to count.

When the counting value reaches the designated counting value, the digital output terminal will output designated counting value arrival signal, and the counter will continue to count.

It can perform reset operation by setting the DI terminal to “Counter Reset” function.

The description of counter function is as shown in Fig. 6-23:

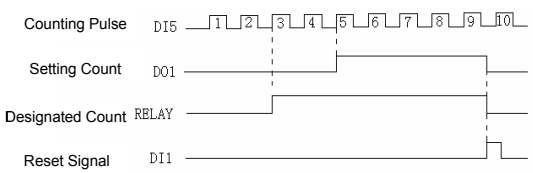


Fig6-23 Schematic Diagram for the Setup Counting Value Reference and Designated Counting Value Reference

Caution:

1) The designated counting value (F7-09) shall not be set to be higher than the setup counting value (F7-08).

The current counter value can be timely viewed via the stop or running display parameter. Refer to F7-13 and F7-14 function codes for details.

F7-10	**Load speed display coefficient**	Factory default value	1.0000

	Setup range		0.0001 to 6.5000	
F7-11	Decimal point position		Factory default value	1
	Setup range	0	No decimal place	
		1	One decimal place	
		2	Two decimal places	
		3	Three decimal places	

The load speed display coefficient and load speed precision are used to display the linear correspondence between the load speed and the inverter output frequency. The load speed is calculated according to the value without decimal place of the output frequency of the inverter.

Load speed display coefficient: It is used for the linear correspondence between the load speed and the inverter output frequency.

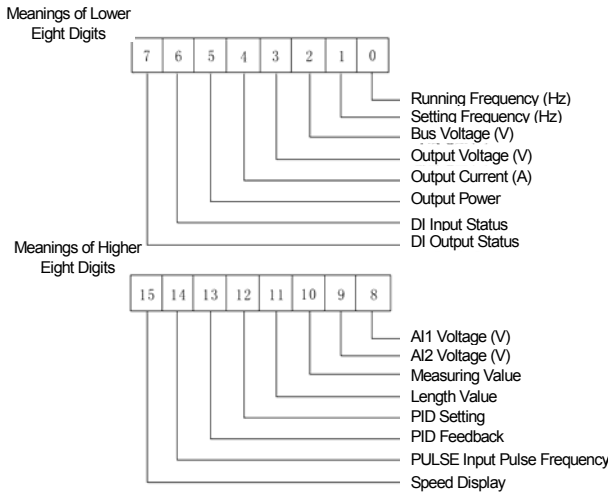
Decimal point position: It is used to set the number of decimal places of the load speed.

For example, if the current inverter output frequency is 50.00Hz and the linear correspondence between the load speed and the inverter output is 1.5 to 1, the F7-10 is set to 1.5000 and then 1.5×5000＝7500. If the position of decimal point is set to 0, the load speed is equal to 7500; if the decimal point position is set to 1, the load speed is equal to 7500.0, and the method applies in the same manner behind.

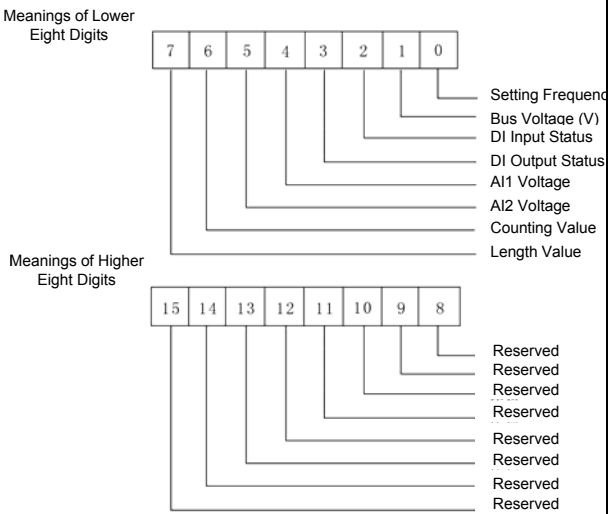
F7-12	Accumulated running time	Factory default value	—
	Setup range	0h to 65535h	

It is used to display the accumulated running time of the inverter. When the accumulated running time (F5-12) reaches this setup running time, the multifunctional digital output terminal DO will output ON signal. Refer to the description of “Running Time Arrival” of output terminal in Group F3 for details.

Caution: The accumulated running time cannot be restored to the factory default value but can be cleared to zero through clearing the record information. Refer to FP-01 function code for the description.

<table>
<tr><td rowspan="2"></td><td colspan="2">LED running display parameter</td><td>Factory default value</td><td>31</td></tr>
<tr><td>Setup range</td><td>1 to 65535</td><td colspan="2"> 

If the above parameters need to be displayed during the operation, it can set their corresponding positions to 1 and then convert this binary number into decimal number and set it to F7-013.</td></tr>
<tr><td>F7-13</td><td colspan="2">LED stop display parameter</td><td>Factory default value</td><td>3</td></tr>
<tr><td>F7-14</td><td colspan="2">LED stop display parameter</td><td>Factory default value</td><td>3</td></tr>
</table>

	Setup range	1 to 255	 If the above parameters need to be displayed at the time of stop, it can set their corresponding positions to 1 and then convert this binary number into decimal number and set it to F7-014.

F7-15	**MF.K key function selection**		Factory default value	0
	Setup range	0	MF.K key function disabled	
		1	Switching between the operation panel command channel and the remote command channel (terminal command channel or serial port command channel)	
		2	Switching between forward and reverse rotations	
		3	Forward jog command	

It is used to set the functions of multifunctional MF.K key.

0: Disabled

1: Operation panel command channel and remote command channel: When the command source (F0-00) is “terminal command channel” (or “serial port communication control channel”), it can perform switching between the “terminal command channel" (or “serial port communication control channel”) and “operation panel command channel”.

2: Switching between forward and reverse rotation

Switching the rotary direction of the motor via the MF.K key on the keyboard is only enabled when the command source (F0-00) is “operation panel command”.

3: Forward jog

It can perform forward jog (FJOG) operation via the MF.K key on the keyboard.

Caution:

1) The switching functions of the MF.K key (channel switching and switching between forward rotation and reverse rotation) can be performed in both the stop and running status.

2) If DI terminal sets the functions of “Keyboard Command Source Switching” or “Terminal Command Source Switching” to be valid. “Operation Panel Command Channel” and “Remote Command Channel function” will be disabled.

F7-16	**STOP/RESET key function**		Factory default value	0
	Setup value	0: The stop function of STOP/RES key is valid only in the keyboard control mode.		
		1: The stop function of STOP/RES key is valid in any control mode.		

0：The stop function of STOP/RES key is valid only in the keyboard control mode: Only when the command source (F0-00) is set to “Operation Panel Control Channel" will the stop function of STOP be valid and the terminal and serial communication control mode are invalid.

1: The stop function of STOP/RES key is valid in any control mode: The stop function of STOP is valid when the command source (F0-00) is in “Operation Panel Control Channel", “Terminal Command Channel”, or “Serial Port Communication Control Channel”.

Remark: The fault reset function of the STOP/RES key is valid in any control mode.

F7-17	**software version No.**	Factory default value	—
	Setup range	software version No.	

Group F8 MS Speed Function and Simple PLC Function

Simple PLC function means that he inverter has a built-in programmable controller (PLC) to perform automatic control on the MS frequency logic. The running time, running direction and running frequency can be set to comply with the process requirements.

This inverter can implement 8-segment speed variable control and has two types of acceleration/deceleration time for selection.

When the setup PLC completes one cycle, it can output PLC circulation end signal via the multifunctional output terminal DO or multifunctional relay (RELAY). Refer to the description of “PLC Circulation End” of the output terminal in Group F3 for details.

When the frequency source selection (F0-01) is set to MS speed running mode, it only needs to set the function codes of F8-00 to F8-08 to determine its characteristics.

F8-00	MS speed 0 reference mode		Factory default value	0
	Setup range	0	Function code F8-01 reference	
		1	AI1	
		2	AI2	
		3	PULSE	
		4	PID	

		5	Preset frequency（F0-03）reference, UP/DOWN can be changed.

It is used to select the reference channel of MS speed 0.

Caution: When F8-00 is seleted to 4, F6-00 (PID reference source) is not selected to 4 (MS speed).

F8-01	**MS speed 0**	Factory default value	0.0%
	Setup range	-100.0% to 100.0%(frequency upper limit F0-05)	
F8-02	**MS speed 1**	Factory default value	0.0%
	Setup range	-100.0% to 100.0%(frequency upper limit F0-05)	
F8-03	**MS speed 2**	Factory default value	0.0%
	Setup range	-100.0% to 100.0%(frequency upper limit F0-05)	
F8-04	**MS speed 3**	Factory default value	0.0%
	Setup range	-100.0% to 100.0%(frequency upper limit F0-05)	
F8-05	**MS speed 4**	Factory default value	0.0%
	Setup range	-100.0% to 100.0%(frequency upper limit F0-05)	
F8-06	**MS speed 5**	Factory default value	0.0%
	Setup range	-100.0% to 100.0%(frequency upper limit F0-05)	
F8-07	**MS speed 6**	Factory default value	0.0%
	Setup range	-100.0% to 100.0%(frequency upper limit F0-05)	
F8-08	**MS speed 7**	Factory default value	0.0%
	Setup range	-100.0% to 100.0%(frequency upper limit F0-05)	

When the frequency source parameter (F0-01) is set to PLC running mode, it only needs to set the function codes of F8-00 to F8-27 to determine the running characteristics of PLC.

The symbols of F8-00 to F8-08 determine the running direction of simple PLC. If the symbol is positive, it indicates that the simple PLC is forward running; if the symbol is negative, it indicates that the simple PLC is reverse running.

Simple PLC running is as shown in Fig.6-24:

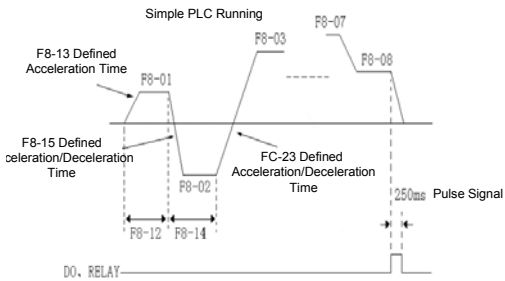


Fig6-24Schematic Diagram for Simple PLC

F8-09	PLC running mode		Factory default value	0
	Setup range	0	Single running stop	
		1	Single running end but the final value remains	
		2	Continuous circulation	

0: Single running stop

Upon completion of one single cycle of the inverter, it will stop automatically and will not start until running command is given again.

1: Single running end but the final value remains

Upon completion of one single cycle of the inverter, the inverter will remain the running frequency and direction of last one phase. After the inverter is restarted upon stop, it will run from the initial status of PLC.

2: Continuous circulation

Upon completion of one single cycle of the inverter, it will enter next one cycle and not stop until stop command is given.

F8-10	PLC power fault memory selection	Factory default value	0

	Setup range	0	Power fault without memory
		1	Power fault memory

PLC power fault memory: The PLC running phase before power fault is memorized. If it runs upon power on, it will run from the memorizing phase.

F8-11	**Running time unit**			Factory default value	0
	Setup range	0	s (second)		
		1	h (hour)		

It is used to set the time unit of running at each phase and can select such time units as second and hour.

Caution: Stop without memory

F8-12	Running time of zero segment of PLC		Factory default value	0.0s(h)
	Setup range	0.0s(h) to 6553.5s(h)		
F8-13	Speed-up/speed-down time selection of zero segment of PLC		Factory default value	0
	Setup range	0	Speed-up/speed-down 1	
		1	Speed-up/speed-down 2	
F8-14	Running time of the first segment of PLC		Factory default value	0.0s(h)
	Setup range	0.0s(h) to 6553.5s(h)		
F8-15	Speed-up/speed-down time selection of the first segment of PLC		Factory default value	0
	Setup range	0	Speed-up/speed-down 1	
		1	Speed-up/speed-down 2	
F8-16	Running time of the second segment of PLC		Factory default value	0.0s(h)
	Setup range	0.0s(h) to 6553.5s(h)		
F8-17	Speed-up/speed-down time selection of the second segment of PLC		Factory default value	0
	Setup range	0	Speed-up/speed-down 1	
		1	Speed-up/speed-down 2	

F8-18	Running time of the third segment of PLC		Factory default value	0.0s(h)
	Setup range	0.0s(h) to 6553.5s(h)		
F8-19	Speed-up/speed-down time selection of the third segment of PLC		Factory default value	0
	Setup range	0	Speed-up/speed-down 1	
		1	Speed-up/speed-down 2	
F8-20	Running time of the fourth segment of PLC		Factory default value	0.0s(h)
	Setup range	0.0s(h) to 6553.5s(h)		
F8-21	Speed-up/speed-down time selection of the fourth segment of PLC		Factory default value	0
	Setup range	0	Speed-up/speed-down 1	
		1	Speed-up/speed-down 2	
F8-22	Running time of the fifth segment of PLC		Factory default value	0.0s(h)
	Setup range	0.0s(h) to 6553.5s(h)		
F8-23	Speed-up/speed-down time selection of the fifth segment of PLC		Factory default value	0
	Setup range	0	Speed-up/speed-down 1	
		1	Speed-up/speed-down 2	
F8-24	Running time of the sixth segment of PLC		Factory default value	0.0s(h)
	Setup range	0.0s(h) to 6553.5s(h)		
F8-25	Speed-up/speed-down time selection of the sixth segment of PLC		Factory default value	0
	Setup range	0	Speed-up/speed-down 1	
		1	Speed-up/speed-down 2	
F8-26	Running time of the seventh segment of PLC		Factory default value	0.0s(h)
	Setup range	0.0s(h) to 6553.5s(h)		

F8-27	Speed-up/speed-down time of the seventh segment of PLC		Factory default value	0
	Setup range	0	Speed-up/speed-down 1	
		1	Speed-up/speed-down 2	

Group F9 Reserved

Group FA Communication Parameters

Refer to MD280F Serial Communication Protocol for details.

Group FB Overload and Protection

FB-00	Motor overload protection selection		Factory default value	1
	Setup range	0： Invalid	0: Without motor overload protection function. It is recommended to install a thermal relay before the motor. 1: The inverter has overload protection function for the motor. Refer to FB-01 and FB-02 for the protection setup.	
		1： Valid		

FB-01	**Motor overload protection gain**	Factory default value	1.00
	Setup range	0.20 to 10.00	

In order to effectively protect the motor with different loads, it needs to set this parameter according to the overload capacity of the motor. The overload protection on motor forms an inverse time-lag curve. When the operating current of the motor reaches the current of 220%×FB-01 times the rated current of motor, it will report motor overload (ERR11) after it lasts one minute. When the operating current of the motor reaches the current of 150%×FB-01 times the rated current of the motor, it will report motor overload (ERR11) after it lasts one minute. The motor overload protection curve is as shown in Fig.6-25:

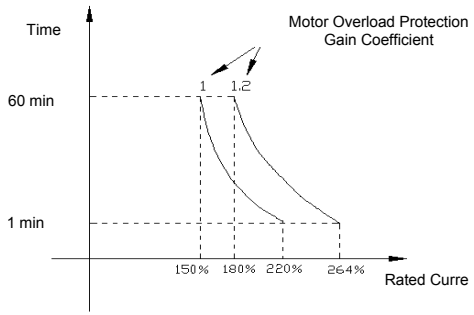


Fig6- 25 Schematic Diagram for inverse time-lag curve of overload protection on motor

FB-02	Motor overload prealarm coefficient	Factory default value	80%
	Setup range	50% to 100%	

When the motor overload detection level reaches this parameter setup value, the multifunctional output terminal DO or fault relay (RELAY) will output motor overload prealarm signal. This parameter is calculated according to the percentage of time for continuous running under certain overload point rather than the overload fault time percentage.

For example, the motor overload protection gain is set to 1, the motor overload prealarm coefficient is set to 80%, when the motor keeps running for 48 seconds (80%×one minute) under 220% of rated current, the multifunctional output terminal DO or fault relay (RELAY) will output motor overload prealarm signal.

FB-03	Ovter voltage stall gain	Factory default value	0
	Setup range	0 to 100	
FB-04	Over voltage stall protection voltage	Factory default value	130%
	Setup range	120% to 150%	

Over-voltage stall gain: It adjusts the inverter's capacity in suppressing the current stall. The bigger the value is, the stronger the capacity is. For the load with small inertia, the value should be small. Otherwise, the dynamic response of the system will be slow. For the load with large inertia, the

value should be large. Otherwise, the suppressing result will be poor, and over voltage fault may be caused.

Over voltage stall protection voltage: It selects the protection point for over voltage stall function. When the value is exceeded, the inverter starts to execute the over voltage stall protection function.

FB-05	Over current stall gain	Factory default value	20
	Setup range	0 to 100	
FB-06	Over current stall protection current	Factory default value	150%
	Setup range	100% to 200%	

Over current stall: When the output current of the inverter reaches setup over current stall protection current (FB-06), if the inverter is running with acceleration speed, it will stop acceleration. When the inverter is running with constant speed, it will reduce the output frequency. When the inverter is running with deceleration speed, it will stop deceleration and the operating frequency will not recover normally till the current is less than the current stall protection current (FB006). Please refer to Fig.6-23 for details.

Over current stall protection current: It selects the protection point for over current stall function. When the value is exceeded, the inverter starts to execute the over current stall protection function. This value is relative to the percentage of rated current of the motor.

Over current stall gain: It adjusts the inverter's capacity in suppressing the over current stall. The bigger the value is, the stronger the capacity is.

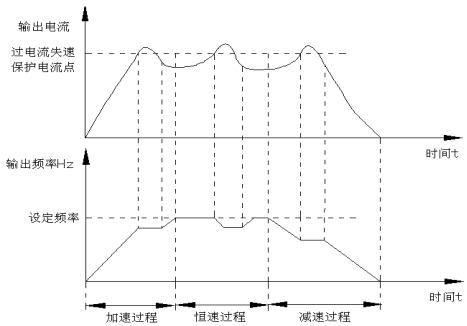


Fig.6-26 Schematic Diagram for over current stall protection

输出电流 Output current
过流失速保护电流点 Over current stall protection current points
输出频率 Output frequency
设定频率 Setup frequency
加速过程 Speed-up process
恒速过程 Constant speed process
减速过程 Speed-down process
时间 Time

Fig.6-26 Schematic Diagram for over current stall protection

FB-07	**Ground short circuit protection upon power-on**		Factory default value	1
	Setup range	0：Invalid	It determines whether the inverter will check if the motor has ground short circuit fault upon power-on. If this function is valid, the inverter has short-time output at the instance of power-up.	
		1：Valid		

FB-08	Load fault protection function	Factory default value	0

	Setup range	0: Invalid	If this function is enabled, when the inverter load fails, the inverter will decelerate from the current running frequency to 2H. If the load is recovered, it will run at the setup frequency.
		1: Valid	

FB-09	Transient stop non-stop function		Factory default value	0
	Setup range	0: Invalid		
		1: Valid		
FB-10	Transient stop non-stop frequency falling rate		Factory default value	10.00Hz/s
	Setup range	0.00Hz/s to maximum frequency（F0-04）		
FB-11	Transient stop non-stop voltage recovery judgment time		Factory default value	0.50s
	Setup range	0.00s to 100.00s		
FB-12	Transient stop non-stop action judgment voltage		Factory default value	80.0%
	Setup range	60.0% to 100.0%		

If the transient stop non-stop function is selected as enabled, when the bus voltage is lower than the transient stop non-stop judgment voltage (FB-12), the inverter will reduce the running frequency according to the reduction rate of transient stop non-stop frequency. When the bus voltage rises and exceeds the transient stop non-stop action judgment voltage (FB-12) and continues to keep instantaneous stop non-stop voltage recovery judgment time (FB-11), the inverter will recover to run with the setup frequency, or the inverter will continue to reduce the operating frequency till stop at zero frequency.Transient stop non-stop function is as shown in Fig.6-23.

If the transient stop non-stop reduction rate is set to a smaller value, the load feedback value will be small and the low voltage cannot be compensated effectively. If this parameter value is too large, the load feedback energy is large and over voltage protection will be caused.

Please adjust this parameter according to the load inertia and weight.

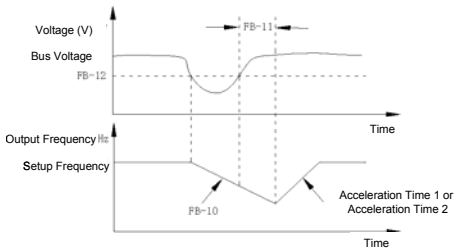


Fig6-23 Schematic Diagram for Instantaneous Stop non-stop Running

FB-13	Fault auto reset times	Factory default value	0
	Setup range	0 to 10	

When the inverter selects fault auto reset, it is used to set the times of auto reset. If this value is exceeded, the inverter will perform fault protection.

Caution:

1) Auto fault reset will not reset the external faults and running time arrival fault automatically.

2) If the fault is reset manually, it will clear the times of auto reset to zero.

FB-14	Fault relay action selection during fault auto reset period		Factory default value: 0
	Setup range	0： No action 1： Action	Select whether the fault relay outputs fault alarm signal during fault auto reset period

FB-15	Fault auto reset interval		Factory default value: 1.0s
	Setup range	0.1s to 60.0s	The waiting time of the inverter from the fault alarm to auto reset.

FB-16	Fault auto reset times checkout time		Factory default value: 1.0h

	Setup range	0.1h to 1000.0h	When the inverter runs for the setup time of this parameter and has no fault, it will clear the times of auto reset to zero.

FB-17	Input phase fault protection selection		Factory default value	1
	Setup range	0： Invalid		
		1： Valid		

MD280 series inverter above 18.5kW has input phase fault protection function.For the inverter below 18.5kW (including 18.5kW) inverter, the input phase fault protection function invalid.

FB-18	Output phase faultprotection selection		Factory default value	1
	Setup range	0：Invalid		
		1：Valid		

FB-19	Inverter module radiator temperature		Factory default value	-
	Setup range	-10℃ to 100℃	Display the Inverter module temperature	

FB-20	The first fault type	0 to 41	
FB-21	The second fault type		
FB-22	The last fault type		

It records the latest 3 fault types for the inverter: 0 means no fault and 1 to 41 correspond to ERR01 to ERR41.Refer to Chapter 8 for the details.

FB-23	**Frequency upon fault**	Display the frequency upon the latest fault	
FB-24	**Current upon fault**	Display the current upon the latest fault	
FB-25	**Bus voltage upon fault**	Display the frequency upon the latest bus fault	

<table>
<tr><td rowspan="4">FB-26</td><td rowspan="4">Input terminal status upon fault</td><td>This value is a decimal number. It displays the status of all the digital terminals of the last fault in the following sequence: BIT7</td><td>BIT 6</td><td>BIT 5</td><td>BIT 4</td><td>BIT 3</td><td>BIT 2</td><td>BIT 1</td><td>BIT 0</td></tr>
<tr><td>reserved</td><td>reserved</td><td>reserved</td><td>DI5</td><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr>
<tr><td colspan="9">It is displayed in decimal numbers corresponding to the status of each digit. When the input terminal is ON, the corresponding value is 1. When the input terminal is OFF, the value is 0. With this value, the user can know the current digital input signal.</td></tr>
</table>

<table>
<tr><td rowspan="3">FB-27</td><td rowspan="3">Output terminal status upon fault</td><td>This value is a decimal number. It displays the status of all the digital output terminals of the last fault in the following sequence:
BIT7</td><td>BIT6</td><td>BIT5</td><td>BIT4</td><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr>
<tr><td>reserved</td><td>Reserved</td><td>reserved</td><td>reserved</td><td>DO3</td><td>DO2</td><td>DO1</td><td>REALY</td></tr>
<tr><td colspan="9">It is displayed in decimal numbers corresponding to the status of each digit. When the output terminal is ON, the corresponding value is 1. When the output terminal is OFF, the value is 0.</td></tr>
</table>

<table>
<tr><td rowspan="2">FB-28</td><td colspan="2">Under-voltage point selection</td><td>Factory default value</td><td>100.0%</td></tr>
<tr><td>Setup range</td><td colspan="3">60.0% to 140.0%
Three phase: 100.0% corresponding bus voltage 350.0V
Two phase: 100.0% corresponding bus voltage 200.0V</td></tr>
</table>

The function is used in the applications where the under-voltage point is required to be changed.

If it is the three-phase inverter, 100.0% corresponding 350.0V, it indicates that enter the under-voltage status when the bus voltage is below 350.0V.

If it is the two-phase inverter, 100.0% corresponding 200.0V, it indicates that enter the under-voltage status.

FB-29	**Zero-current detection level**		Factory default value	5.0%
	Setup range	0.0% to 300.0% 100.0% corresponding motor rated current		
FB-30	**Zero-current detection delay time**		Factory default value	0.10s
	Setup range	0.01s to 600.00s		

When the motor is running, if the current of the inverter is below FB-29, and the continuous time arrive FB-30, the DO output the 'zero-current is detected'（DO-18）.

Group C The Second Motor Parameter

FC-00	**Rated power**	Factory default value	Model dependent
	Setup range	0.2kW to 1000.0kW	
FC-01	**Rated voltage**	Factory default value	Model dependent
	Setup range	0V to 480V	
FC-02	**Rated current**	Factory default value	Model dependent
	Setup range	0.1A to 6553.5A	
FC-03	**Rated frequency**	Factory default value	Model dependent
	Setup range	0.00Hz to maximum frequency（F0-04）	
FC-04	**No-load current**	Factory default value	Model dependent
	Setup range	0.1A to 6500.0A	
FC-05	**Stator resistance**	Factory default value	Model dependent
	Setup range	0.001Ω to 65.535Ω	

The function code defines the parameter of the second motor,please refers to F1-00 to F1-03，F1-15，F1-16 for details.

Caution：

1、 The motor selection can be determined via DI terminal function 32 and “stwiching of the first motor and the second motor”

2、 V / F curve of No. 2 motor is linear by default.

FC-06	**Torque hoist**	Factory default value	1.0%
	Setup range	0.0%（auto） to 30.0%	

Please refer to the description of function code F1-05.

FC-07	Slip compensation coefficient	Factory default value	0.0%
	Setup range	0.0% to 200.0%	

Please refer to the description of function code F1-13.

FC-08	Oscillation suppression gain	Factory default value	Model dependent

	Setup range	0 to 100

Please refer to the description of function code F1-17.

FC-09	Speed-up/speed-down time selection of the second motor		Factory default value	0
	Setup range	0	Be consistent with the first motor	
		1	Speed-up/speed-down time 1	
		2	Speed-up/speed-down time 2	

The function code defines the speed-up/speed-down time selection of the second motor.

0:Speed-up/speed-down time of the second motor is consistent with the first motor's.

1: The speed-up/speed-down time of the second motor is speed-up/speed-down time 1, that is, F0-09 (speed-up time 2) and F5-05 (speed-down time1).

2: The speed-up/speed-down time of the second motor is speed-up/speed-down time 2, that is, F5-04 (speed-up time 2), F5-05 (speed-down time 2).

Group FF Factory Default Parameters (Reserved)

Group FP User password

FP-00	User password	Factory default value	0
	Setup range	0 to 65535	

The password setting function is used to prohibit the unauthorized person from viewing and modifying the parameters.

When the parameter is set to any non-zero number, the password protection function is enabled. If no password is needed, change the parameter value to 00000.

After the user password is set and takes effect, when entering the password setting state, if the user password is incorrect, you cannot view and modify the parameter. You can only view the operation display parameters and stop display parameters.

Please keep your password in mind. If you set the password mistakenly or forget the password, please contact the manufacturer.

FP-01	Parameter initialization	Factory default value	0

	Setup range	0	No operation
		1	Restore the factory default value
		2	Clear memory

0: No function.

1: The inverter restores all the parameters excluding the following parameters to the factory default values:

1) Motor parameters (Group F1): F1-00 to F1-03, F1-15 and F1-16;

2) Accumulated running time (F7-12) and inverter module temperature (FB-19);

3) Fault type parameters: FB-20 to FB-27;

4) User password: FP-00

2: clear memory: The inverter clears the fault records (FB-20 to F1-03) and accumulated running time (F7-12) to zero.

7

EMC

Chapter 7 EMC (Electromagnetic Compatibility)

7.1 Definition

Electromagnetic compatibility is the ability of the electric equipment to run in the electromagnetic interference environment and implement its function stably without interferences on the electromagnetic environment.

7.2 EMC Standard Description

In accordance with the requirements of the national standard GB/T12668.3, the inverter needs to comply with electromagnetic interference and anti-electromagnetic interference requirements.

The existing products of our company apply the latest international standard—IEC/EN61800-3：2004 (Adjustable speed electrical power drive systems---part 3:EMC requirements and specific test methods), which is equivalent to the national standard GB/T12668.3.

IEC/EN61800-3 assesses the inverter in terms of electromagnetic interference and anti-electronic interference. Electromagnetic interference mainly tests the radiation interference, conduction interference and harmonics interference on the inverter (required for the inverter for civil use)Anti-electromagnetic interference mainly tests the conduction interference rejection, radiation interference rejection, surge interference rejection, fast and mutable pulse group interference rejection, ESD interference rejection and power low frequency end interference rejection (specific test items including: 1. Interference rejection tests of input voltage sag, interrupt and change; 2. Phase conversion interference rejection test; 3. Harmonic input interference rejection test; 4. Input frequency change test; 5. Input voltage unbalance test; 6. input voltage fluctuation test).

The tests shall be conducted strictly in accordance with the above requirements of IEC/EN61800-3, and the products of our company are installed and used according to Section 7.3 and have good electromagnetic compatibility in general industry environment.

7.3 EMC Guide

7.3.1 Harmonic Effect

Higher harmonics of power supply may damage the inverter. Thus, at some places where mains quality is rather poor, it is recommended to install AC input reactor.

7.3.2 Electromagnetic Interference and Installation Precautions

There are two kinds of electromagnetic interferences, one is interference of electromagnetic noise in the surrounding environment on the inverter, and the other is interference of inverter on the surrounding equipment.

Installation precautions:

A、 The earth wires of the Inverter and other electric products shall be well grounded;

B、 The power input and output power cables of the inverter and weak current signal cables (e.g. control line) shall not be arranged in parallel and vertical arrangement is preferable.

C、 It is recommended that the output power cables of the inverter employ shield cables or steel pipe shielded cables and that the shielding layer be grounded reliably. The lead cables of the equipment suffering interferences are recommended to employ twisted-pair shielded control cables, and the shielding layer shall be grounded reliably.

D、 When the length of motor cable is longer than 100 meters, it needs to install output filter or reactor.

7.3.3 Handling method for the interferences of the surrounding electromagnetic equipment on the inverter:

The electromagnetic interference on the inverter is generated because plenty of relays, contactors and electromagnetic brakes are installed near the inverter. When the inverter has error action due to the interferences, the following measures can be taken:

A、 Install surge suppressor on the devices generating interference;

B、 Install filter at the input end of the inverter. Refer to Section 7.3.6 for the specific operations.

C、 The lead cables of the control signal cable of the inverter and the detection line employ shielded cable and the shielding layer shall be grounded reliably.

7.3.4 Handling method for the interferences of inverter on the surrounding equipment:

These interferences include two types: one is radiation interference of the

inverter, and the other is conduction interference of the inverter. These two types of interferences cause the surrounding electric equipment to suffer electromagnetic or electrostatic induction. The surrounding equipment hereby produces error action. For different interferences, it can be handled by referring to the following methods:

A、 For the measuring meters, receivers and sensors, their signals are generally weak. If they are placed nearby the inverter or together with the inverter in the same control cabinet, they are easy to suffer interference and thus generate error actions. It is recommended to handle with the following methods: Put in places far away from the interference source; do not arrange the signal cables with the power cables in parallel and never bind them together; both the signal cables and power cables employ shielded cables and are well grounded; install ferrite magnetic ring (with suppressing frequency of 30 to 1,000MHz) at the output side of the inverter and wind it 2 to 3 cycles; install EMC output filter in more severe conditions.

B、 When the equipment suffering interferences and the inverter use the same power supply, it may cause conduction interference. If the above methods cannot remove the interference, it shall install EMC filter between the inverter and the power supply (refer to Section 7.3.6 for the prototyping operation);

C、 The surrounding equipment is separately grounded, which can avoid the interference caused by the leakage current of the inverter's grounding wire when common grounding mode is adopted.

7.3.5 Leakage current and handling

There are two forms of leakage current when using the inverter. One is leakage current to the earth, and the other is leakage current between the cables.

1. Factors of affecting the ground leakage current and solutions:

There are distributed capacitance between the lead cables and the earth. The larger the distributed capacitance is, the larger the leakage current will be. The distributed capacitance can be reduced by effectively reducing the distance between the inverter and the motor. The higher the carrier frequency is, the larger the leakage current will be. The leakage current can be reduced by reducing the

carrier frequency. However, reducing the carrier frequency may result in addition of motor noise. Note that additional installation of reactor is also an effective method to remove the leakage current.

2. The leakage current may increase following the addition of circuit current. Therefore, when the motor power is high, the corresponding leakage current will be high too.

2. Factors of producing leakage current between the cables and solutions:

There is distributed capacitance between the output cables of the inverter. If the current passing the lines has higher harmonic, it may cause resonance and thus result in leakage current. If thermal relay is used, it may generate error action.

The solution is to reduce the carrier frequency or install output reactor. It is recommended that thermal relay not be installed before the motor when using the inverter, and that electronic over current protection function of the inverter be used instead.

7.3.6 Precautions for Installing EMC input filter at the input end of power supply

1、When installing the EMC input filter at the input end of the power supply, it is recommended to use the EMC filter produced by Shanghai Eagtop Electronic Technology Co., Ltd.

2、When using the inverter, please follow its rated values strictly. Since the filter belongs to Classification I electric appliances, the metal enclosure of the filter shall be large and the metal ground of the installing cabinet shall be well earthed and have good conduction continuity. Otherwise there may be danger of electric shock and the EMC effect may be greatly affected.

3、Through the EMC test, it is found that the filter ground must be connected with the PE end of the inverter at the same public earth. Otherwise the EMC effect may be greatly affected.

4、The filter shall be installed at a place close to the input end of the power supply as much as possible.

8

Fault Diagnosis and Countermeasures

Chapter 8 Fault Diagnosis and Countermeasures

8.1 Fault Alarm and Countermeasures

MD280 inverter has a number of warning information and protection function. In case of abnormal fault, the protection function will be invoked, the inverter will stop output, and the faulty relay contact of the inverter will start, and the fault code will be displayed on the display panel of the inverter. Before consulting the service department, the user can perform self-check according to the prompts of this chapter, analyze the fault cause and find out t solution. If the fault is caused by the reasons as described in the dotted frame, please consult the agents of inverter or our company directly.

In the warning information, Err08 refers to the buffer overload fault resistance, the frequent bus voltage jumps below the under-voltage-point which is caused by the instability input voltage, and fErr08 fault is easily caused.When the fault occurs, please disconnect the power supply to wait at least 5 minutes to ensure that input voltage normal after power-on.

Err26 refers to running time arrival fault, please refers to the description of F5-13 (that is the running time arrival action selection).

Err31 refers to software over-current fault, please refers to the description of F5-25 (that is the software over-current point).

Err40 refers to the fast current-limit and overtime fault, please refer to description of F5-20 (that is the fast current-limit function selection)
Err41 refers to the swiching motor fault, please refers to the description of group FC (The second motor parameter).

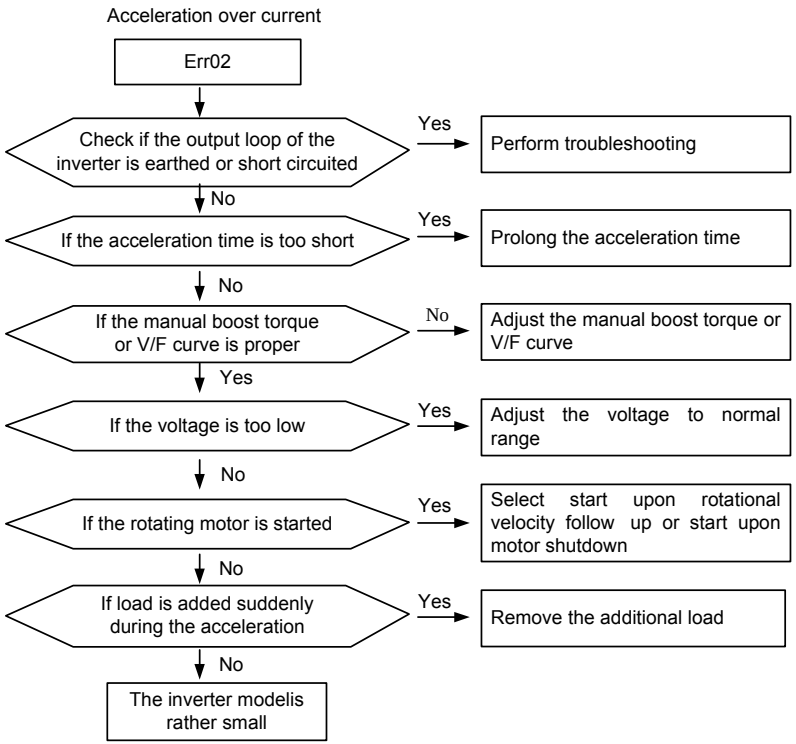

Acceleration over current
Err02
Check if the output loop of the inverter is earthed or short circuited
Yes
Perform troubleshooting
No
If the acceleration time is too short
Yes
Prolong the acceleration time
No
If the manual boost torque or V/F curve is proper
No
Adjust the manual boost torque or V/F curve
Yes
If the voltage is too low
Yes
Adjust the voltage to normal range
No
If the rotating motor is started
Yes
Select start upon rotational velocity follow up or start upon motor shutdown
No
If load is added suddenly during the acceleration
Yes
Remove the additional load
No
The inverter modelis rather small

Fig.8-1 Acceleration over current (ERR02)

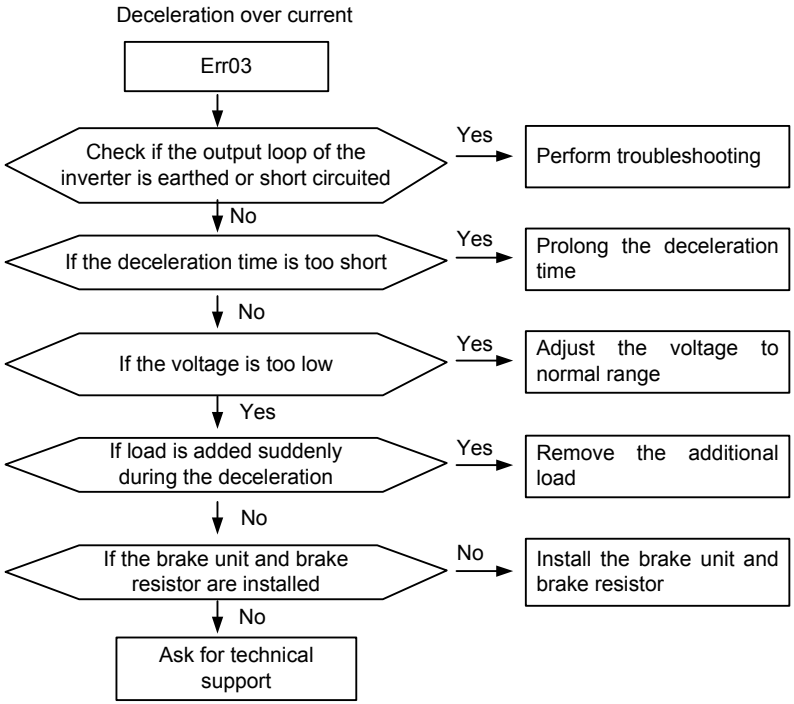


Fig.8-2 Deceleration over current (ERR03)

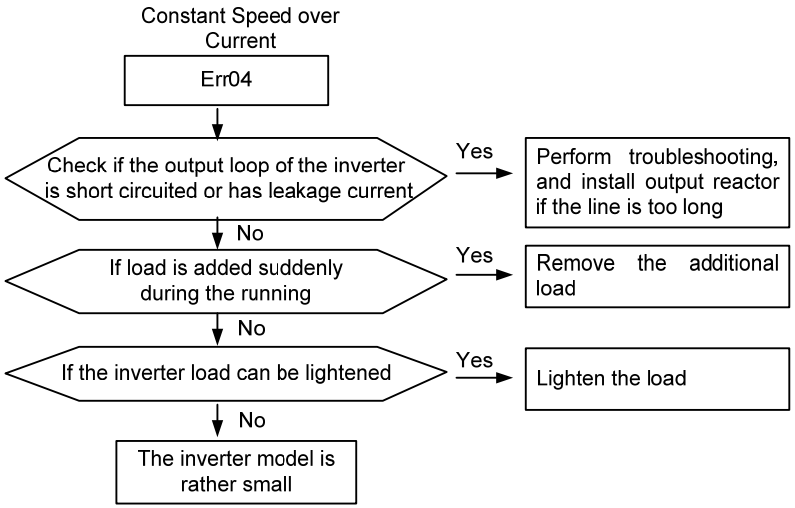

Constant Speed over Current
Err04
Check if the output loop of the inverter is short circuited or has leakage current
Yes
Perform troubleshooting, and install output reactor if the line is too long
No
If load is added suddenly during the running
Yes
Remove the additional load
No
If the inverter load can be lightened
Yes
Lighten the load
No
The inverter model is rather small

Fig.8-3 Constant speed over current (ERR04)

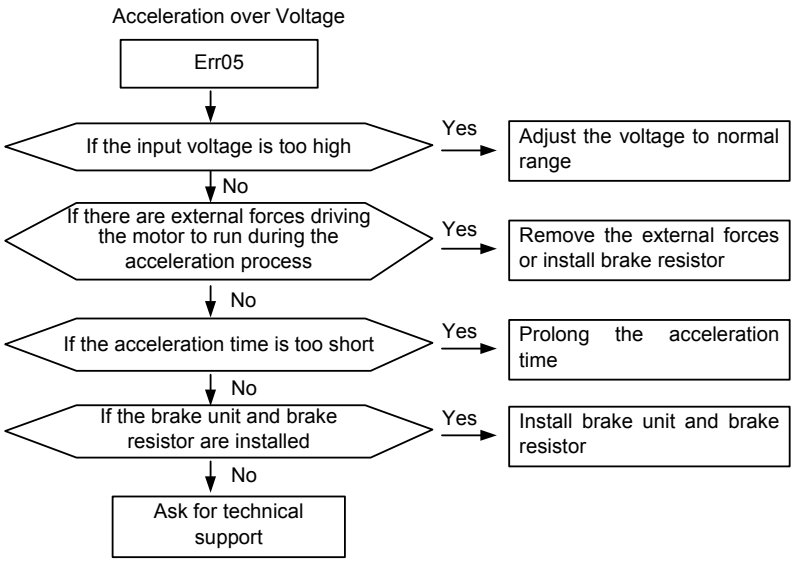

Acceleration over Voltage
Err05
If the input voltage is too high
Yes
Adjust the voltage to normal range
No
If there are external forces driving the motor to run during the acceleration process
Yes
Remove the external forces or install brake resistor
No
If the acceleration time is too short
Yes
Prolong the acceleration time
No
If the brake unit and brake resistor are installed
Yes
Install brake unit and brake resistor
No
Ask for technical support

Fig. 8-4 Acceleration over voltage (ERR05)

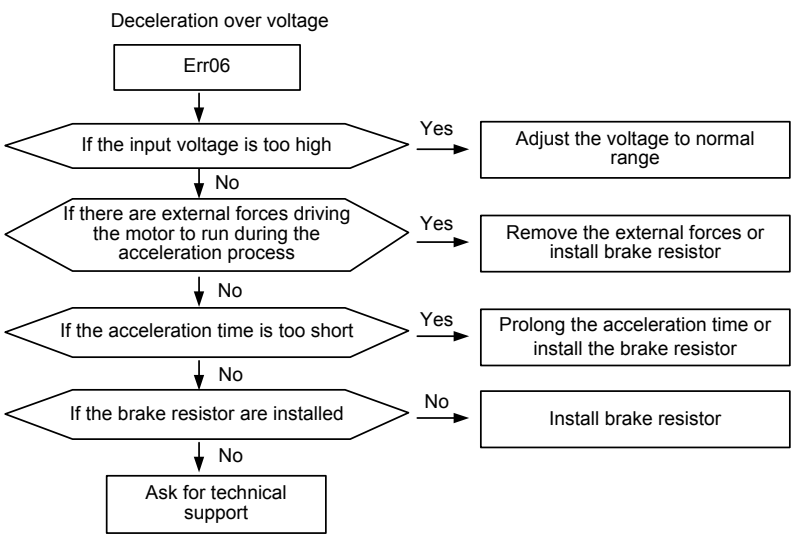

Deceleration over voltage
Err06
If the input voltage is too high
Yes
Adjust the voltage to normal range
No
If there are external forces driving the motor to run during the acceleration process
Yes
Remove the external forces or install brake resistor
No
If the acceleration time is too short
Yes
Prolong the acceleration time or install the brake resistor
No
If the brake resistor are installed
No
Install brake resistor
No
Ask for technical support

Fig.8-5 Deceleration over voltage (ERR06)

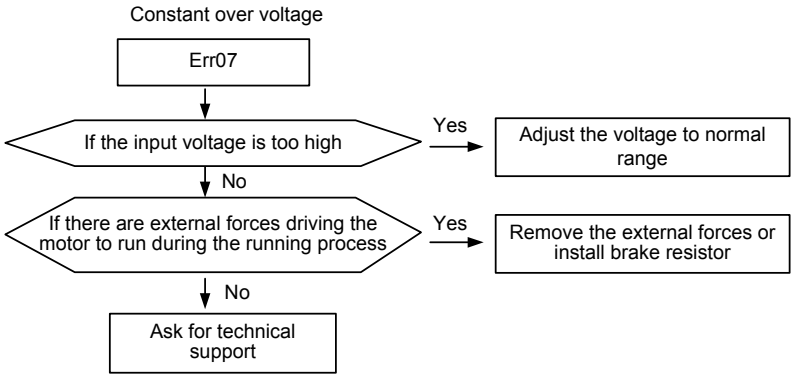

Constant over voltage
Err07
If the input voltage is too high
Yes
Adjust the voltage to normal range
No
If there are external forces driving the motor to run during the running process
Yes
Remove the external forces or install brake resistor
No
Ask for technical support

Fig.8-6 Constant speed over voltage (ERR07)

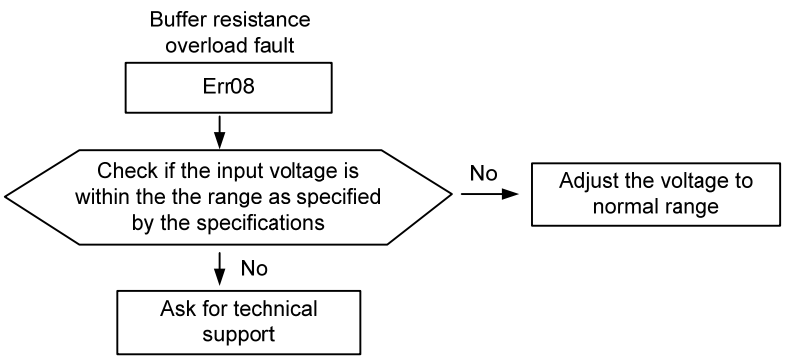

Buffer resistance overload fault
Err08
Check if the input voltage is within the the range as specified by the specifications
No
Adjust the voltage to normal range
No
Ask for technical support

Fig.8-7 Buffer resistance overload fault （Err08）

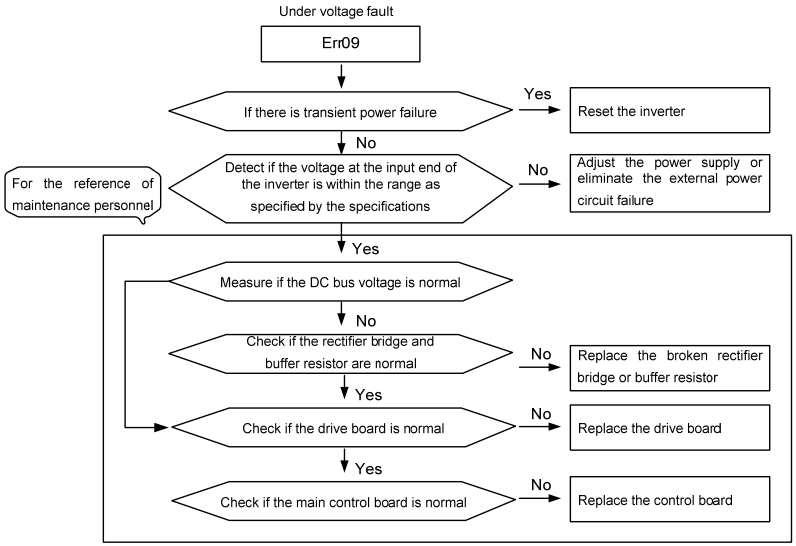

Under voltage fault
Err09
If there is transient power failure
Yes
Reset the inverter
No
For the reference of maintenance personnel
Detect if the voltage at the input end of the inverter is within the range as specified by the specifications
No
Adjust the power supply or eliminate the external power circuit failure
Yes
Measure if the DC bus voltage is normal
No
Check if the rectifier bridge and buffer resistor are normal
No
Replace the broken rectifier bridge or buffer resistor
Yes
Check if the drive board is normal
No
Replace the drive board
Yes
Check if the main control board is normal
No
Replace the control board

Fig.8-8 Under voltage fault (ERR09)

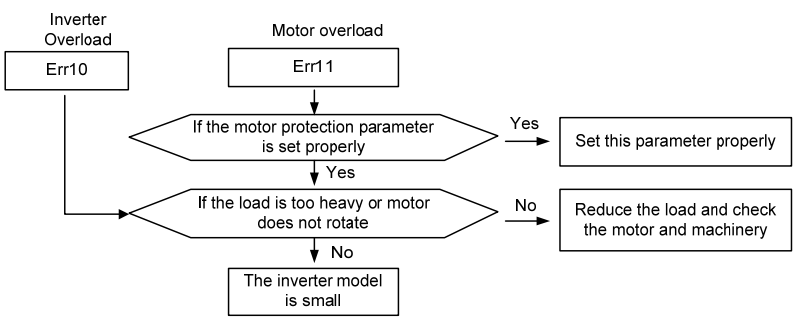


Fig. 8-9 Under voltage overload （Err10/Err11）

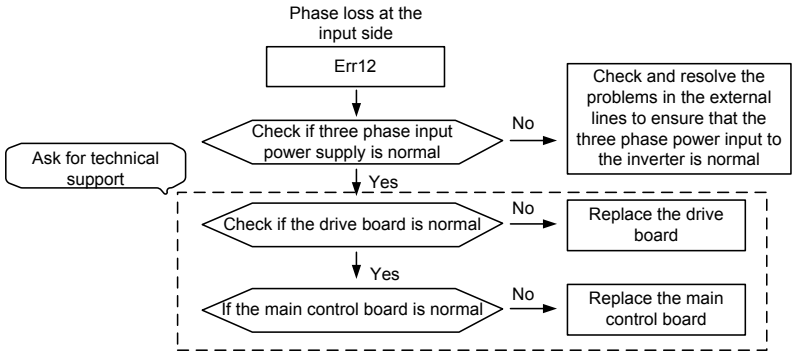

Phase loss at the input side
Err12
Check if three phase input power supply is normal
No
Check and resolve the problems in the external lines to ensure that the three phase power input to the inverter is normal
Ask for technical support
Yes
Check if the drive board is normal
No
Replace the drive board
Yes
If the main control board is normal
No
Replace the main control board

Fig.8-10 Phase failure at input side (ERR12)

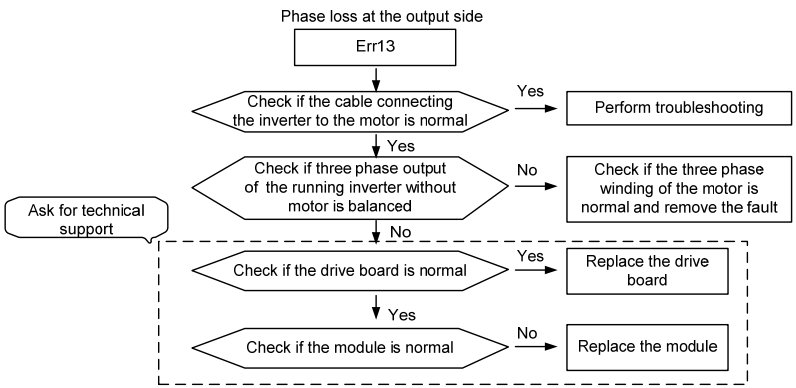

Phase loss at the output side
Err13
Check if the cable connecting the inverter to the motor is normal
Yes
Perform troubleshooting
Yes
Check if three phase output of the running inverter without motor is balanced
No
Check if the three phase winding of the motor is normal and remove the fault
Ask for technical support
No
Check if the drive board is normal
Yes
Replace the drive board
Yes
Check if the module is normal
No
Replace the module

Fig.8-11 Phase failure at output side (ERR13)

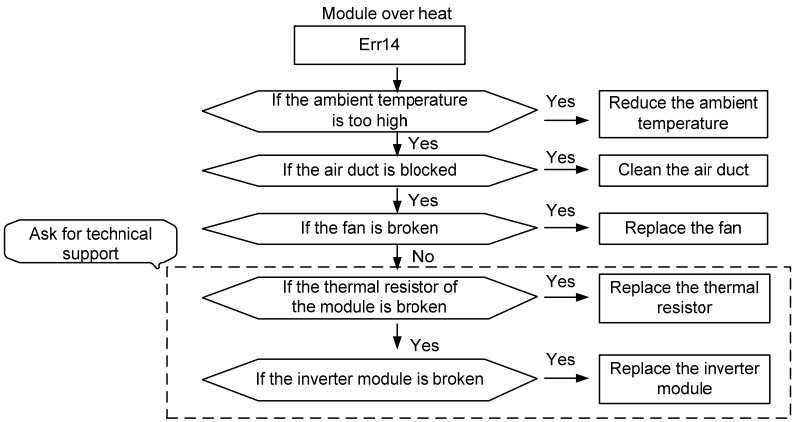


Fig.8-12 Module overheating (ERR14)

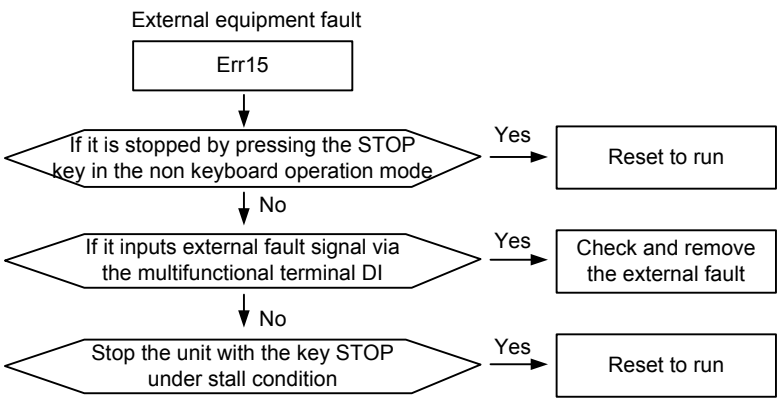

External equipment fault
Err15
If it is stopped by pressing the STOP key in the non keyboard operation mode
Yes
Reset to run
No
If it inputs external fault signal via the multifunctional terminal DI
Yes
Check and remove the external fault
No
Stop the unit with the key STOP under stall condition
Yes
Reset to run

Fig.8-13 External equipment fault (ERR15)

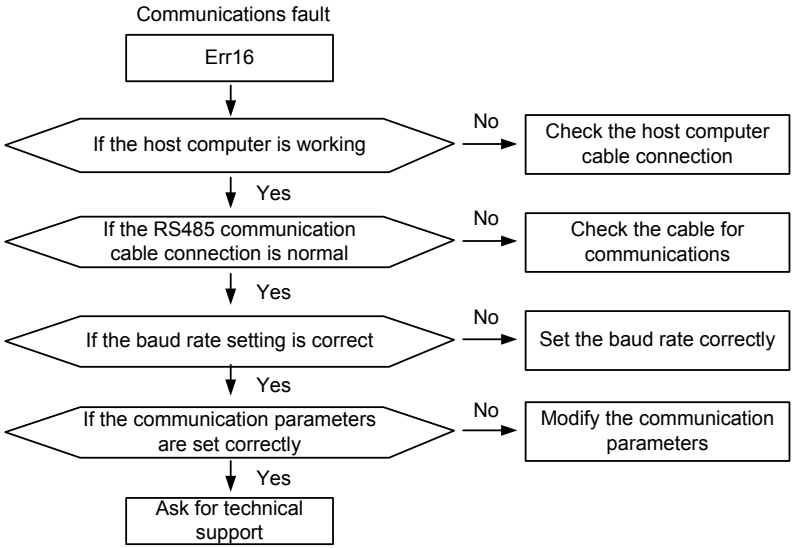


Fig.8-14 Communication fault (ERR16)

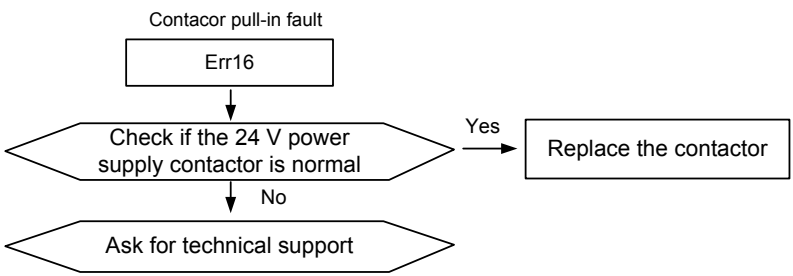


Fig. 8-15 Contacor pull-in fault

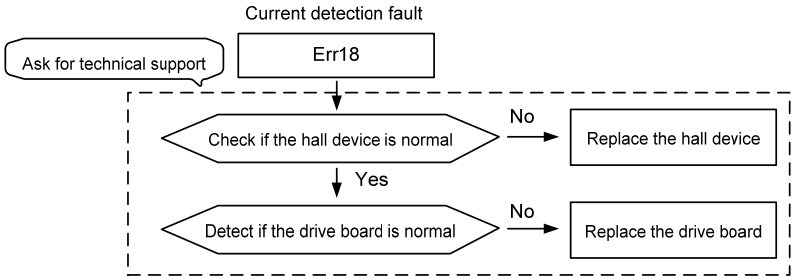


Fig.8-16 Current detection fault (ERR18)

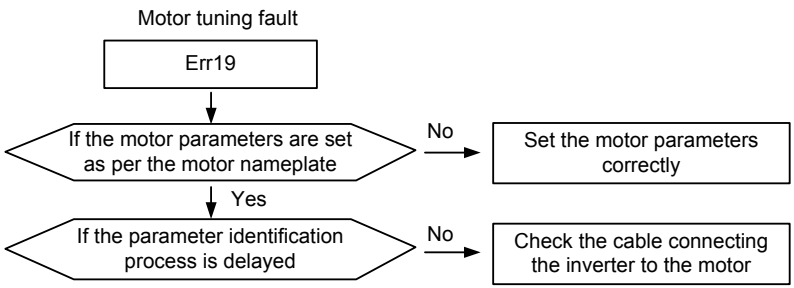

Motor tuning fault
Err19
If the motor parameters are set as per the motor nameplate
No
Set the motor parameters correctly
Yes
If the parameter identification process is delayed
No
Check the cable connecting the inverter to the motor

Fig.8-17 Motor tuning fault (ERR19)

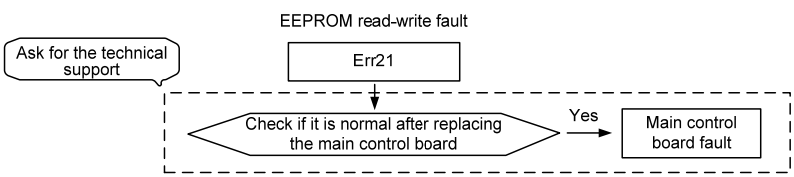

EEPROM read-write fault
Ask for the technical support
Err21
Check if it is normal after replacing the main control board
Yes
Main control board fault

Fig.8-18 EEPROM read-write fault

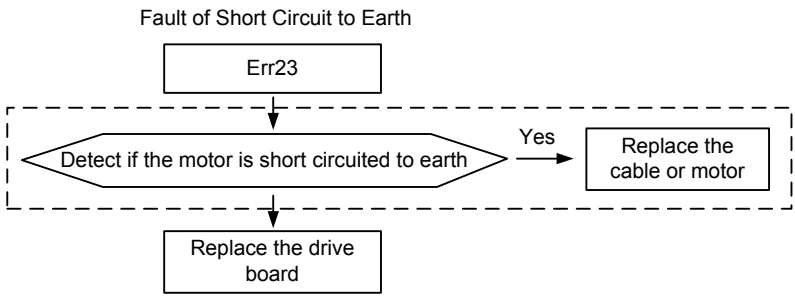

Fault of Short Circuit to Earth
Err23
Detect if the motor is short circuited to earth
Yes
Replace the cable or motor
Replace the drive board

Fig.8-19 Earth short circuit fault (ERR23)

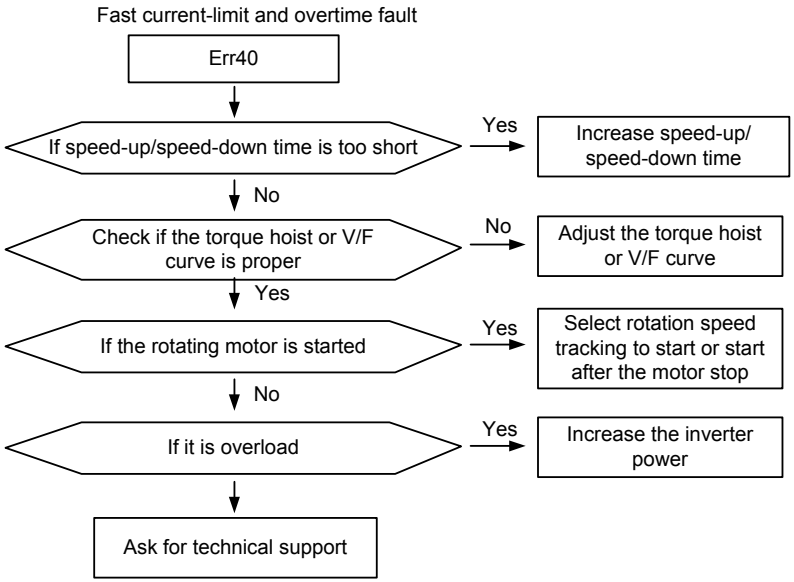


Fig.8-20 Fast current-limit and overtime fault

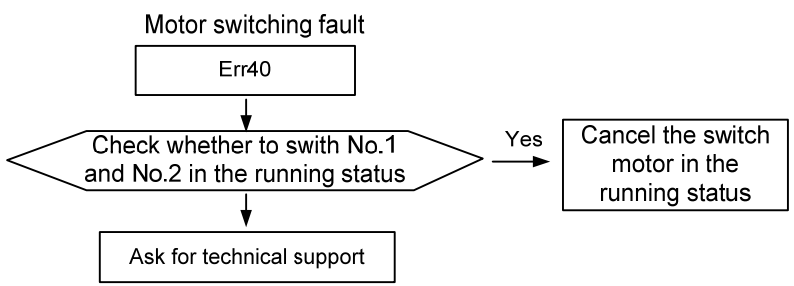

Motor switching fault
Err40
Check whether to swith No.1 and No.2 in the running status
Yes
Cancel the switch motor in the running status
Ask for technical support

Fig. 8-20 Motor switching fault （Err41）

8.2 Common Fault and Resolution

During the inverter using process, the following faults may occur. Please conduct simple fault analysis by referring to the methods below:

No.	Fault Phenomenon	Possible Cause	Solution
1	No display or error codes occur upon power-on	1、The inverter has abnormal input power supply. 2、8-core and 16-core bus connecting with the drive board and control panel is in poor contact. 3、The internal parts of the inverter are damaged.	a) Check the input power supply. b) Plug/unplug the 8-core and 16-core buses once again. c) Consult the manufacturer.
2	"ERR23" alarm is displayed upon power-on	1. The motor or the output line is short circuited to the earth. 2、The inverter is damaged.	1、Measure the insulation of the motor and output line with magneto-ohmmeter. 2、Consult the manufacturer.
3	The inverter displays normally upon power-on, but "HC" is displayed upon running and stops immediately.	The fan is either damaged or blocked.	Replace the fan
4	ERR14 (module overheating) fault is frequently	1、The carrier frequency is set too high. 2、The fan is damaged or the air duct is blocked.	1、Reduce the carrier frequency. 2、Replace the fan and clear the air duct. 3、Consult the

No.	Fault Phenomenon	Possible Cause	Solution
	reported.	3、 The internal parts (thermal coupler or others) of the inverter are damaged.	manufacturer.
5	The motor does not rotate upon Inverter running.	1、The motor is either damaged or blocked. 2、The parameter is set wrongly.	1、Replace the motor or remove the mechanical fault. 2、Check and reset the parameters.
6	DI terminal invalid	1、 The parameter is set wrongly. 2、 Wiring is conducting wrongly. 3、 Control board fault	1、Check and reset the relevant parameters. 2、Reconnect the cables. 1、 Consult the manufacturer.
7	The inverter frequently reports over current fault and over voltage fault.	1、 The motor parameters are set wrongly. 2、 Speed-up/speed-down time is impor 3、 Load fluctuates.	1、 Reset Group F1 parameters. 2、 Set proper acceleration/deceleration. 3、 Consult the manufacturer.

Appendix Communication Protocol

MD280 series of inverter provides RS485 communication interface, User can carry out centralized monitoring through PC/PLC to get operating requirements.（Set the inverter running command, function code parameters and read the work status and fault information,etc）The RS232/RS485 conversion device is required if the interface of the external device is RS232.

1、About Protocol

This serial communication protocol defines the transmission information and use format in the series communication and it includes master-polling (or broadcasting) format, master coding method and the content includes function code of action, transferring data and error checking. The response of slave is the same structure, and it includes action confirmation, returning the data and error checking etc. If slave takes place the error while it is receiving the information or cannot finish the action demanded by master, it will send one fault signal to master as a response.

2、Application Method

The inverter will be connected into a “Single-master Multi-slave” PC/PLC control net with RS232/RS485 bus.

3、Bus structure

1）Interface mode

RS485 Hardware interface. The RS232/RS485 conversion device is required when the interface of the external device is RS232.

2）Transmission mode

There provide asynchronous series and half-duplex transmission mode. At the same time, just one can send the data and the other only receives the data between master and slave. In the series asynchronous communication, the data is sent out frame by frame in the form of message.

3）Topological mode

In Single-master system, the setup range of slave address is 0 to 247. Zero refers to broadcast communication address. The address of slave must is exclusive in the network. That is one condition of one slave machine.

4、Protocol Description

MD280 series inverter communication protocol is a asynchronous serial master-slave communication protocol, in the network, only one equipment, and master can build a protocol, (Named as “Inquire/Command”). Otherequipments, slave’s response “Inquire/Command” of master only by providing the data or doing the action according to the master’s “Inquiry/Command”. Here, master is Personnel Computer, Industrial Machine or Programmable logical controller, and the slave is inverter. Master not only visits some slave, but also sends the broadcast information to all the slaves. For the single master “Inquiry/Command”, all of slaves will return a signal that is a response; for the broadcast information provided by master, slave needs not feedback a response to master machine.

5、Communication Data Structure

ModBus protocol communication data format of MD280 series of inverter is shown as following:

（In RTU mode, messages start with a interval of at least 3.5 character times. The first field then transmitted is the device address.The allowable characters transmitted for all fields are hexadecimal 0 ... 9, A ... F. Networked devices monitor the network bus continuously, including during the silent intervals. When the first field (the address field) is received, each device decodes it to find out if it is the addressed device. Following the last transmitted character, a similar interval of at least 3.5 character times marks the end of the message. A new message can begin after this interval）

The entire message frame must be transmitted as a continuous stream. If a silent interval of more than 1.5 character times occurs before completion of the frame, the receiving device flushes the incomplete message and assumes that the next byte will be the address field of a new message.

Similarly, if a new message begins earlier than 3.5-character times following a previous message, the receiving device will consider it a continuation of the previous message. This will set an error, as the value in the final CRC field will not be valid for the combined messages. A typical message frame is shown below.

1）RTU frame format

START	3.5-character time
ADDR	Communication addr. : 0 to 247
CMD	03:Read slave parameters 06: Write slave parameters
DATA（N-1）	Function code parameter address, the number of function code parameter, Function code parameter,etc.
DATA（N-2）	
……	
DATA0	
CRC CHK low order	Detection Value: CAC value
CRC CHK high order	
END	At least 3.5-character time

2）CMD and DATA

Command code: 03H reads N words. (There are 12 characters can be read at the most.)

For example: The inverter start address F002 of the slave 01 continuously reads two consecutive values.

ADDR	01H
CMD	03H
Byte number high order	F0H
Byte number low order	02H
Register number high order	00H
Register number low order	02H
CRC CHK low order	CRC CHK values are to be calculated
CRC CHK high order	

Slave responding information

ADDR	01H
CMD	03H
Byte number	04H
Data F002H high order	00H
Data F002H low order	00H
Data F003H high order	00H

Data F003H low order	01H
CRC CHK low order	CRC CHK values are to be calculated
CRC CHK high order	

Command code: Command Code：06H，write a word.
For example:Write 5000（1388H）into F00AH which slave address is 02H.

Master command information

ADDR	02H
CMD	06H
Data addr. high order	F0H
Data addr. high order	04H
Data content high order	13H
Data content low order	88H
CRC CHK low order	CRC CHK values are to be calculated
CRC CHK high order	

Slave responding information

ADDR	02H
CMD	06H
Data address high order	F0H
Data address low order	04H
Data Content high order	13H
Data Content low order	88H
CRC CHK low order	CRC CHK values are to be calculated
CRC CHK high order	

3）Cyclical Redundancy Check

In RTU mode, messages include an error-checking field that is based on a CRC method. The CRC field checks the contents of the entire message. The CRC field is two bytes, containing a 16-bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value it received in the CRC field. If the two values are not equal, an error results.
The CRC is started by 0xFFFF.Then a process begins of applying successive eight-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.

During generation of the CRC, each eight-bit character is exclusive ORed with the register contents. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position.The LSB is extracted and examined.If the LSB was a 1, the register is then exclusive ORed with a preset, fixed value. If the LSB was a 0, no exclusive OR takes place. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value.

When the CRC is appended to the message, the low byte is appended first, followed by the high byte.

```
unsigned int CrcValueCalc(const unsigned int *data, unsigned int length)
{
    unsigned int crcValue = 0xffff;
    int i;

    while (length--)
    {
        crcValue ^= *data++;

        for (i = 8 - 1; i >= 0; i--)
        {
            if (crcValue & 0x0001)
            {
                crcValue = (crcValue >> 1) ^ 0xa001;
            }
            else
            {
                crcValue = crcValue >> 1;
            }
        }
    }

    return (crcValue);
}
```

4）Communication Parameter Address

The chapter is about communication contents, it’s used to control the

inverter operation, the status of the inverter and related parameter setup.
Read and write function-code parameters (Some functional code is not changed, only for the manufacturer use.)
The mark rules of Function code parameters address:
The group number and mark of function code is the parameter address for indicating the rules.
High byte：F0 to FF
Low byte: 00 to FF
For example: F3-12, the address indicates to F30C.
Caution:
Group FF: Manufacturer Parameters.The user is not allowed to access Group FF.
Some parameters can not be changed during operation, some parameters regardless of what kind of state the inverter in, the parameters can not be changed.Change the function code parameters, pay attention to the scope of the parameters, units, and relative instructions.

Besides, due to EEPROM is frequently stored, it will reduce the lifetime of EEPROM.In the communication mode, and some function code needn't be stored as long as change the RAM value. To achieve this function, change high order F of the function code into zero.
Corresponding function code addresses are indicated below:
High byte: 00 to 0F
Low byte: 00 to FF
For example: Function code F3-12 can not be stored into EEPROM, address indicates to be EEPROM.
This address can only act writing RAM, it can not act reading, when act reading, it is invalid address.

Stop/stop parameter:

Parameter addr.	Parameter description
1000H	Communication setup value(-10000 to 10000)(Decimal)
1001H	Running frequency
1002H	Bus voltage
1003H	Output voltage
1004H	Output current
1005H	Output power
1006H	Reserved
1007H	Reserved
1008H	DI input status
1009H	DO output status
100AH	AI1 voltage
100BH	AI1 voltage
100CH	Reserved
100DH	Counting value input
100EH	Length value input
100FH	Load speed
1010H	PID setup
1011H	PID feedback
1012H	PLC process

Caution:

For the patameters of this part, the communication setup frequency value is the percentage of the maximum frequency (-100.00% to 100.00%), which can be communication read and write.The other parameters can be read but not wrote.

Control command input to inverter (write-only)

Command word address	Command function
2000H	0001： Forward operation
	0002： Reverse operation
	0003： Forward jog
	0004： Reverse jog
	0005： Free stop
	0006： Speed-down stop
	0007： Fault reset
	0100： Restore factory default value
	0101： Clear the record information

Caution:

For 0100H （restore the factory value）and 0101H (clear the recorded information),which must be removed the password locking,please refer to the parameter locking password check (4000H command addr.).

If there is user password (FP-00 is not zero), write the correct user password for 4000H command address.If there is no user password (FP-00 is zero), write zero to remove password locking for 4000H command address.

After the host computer is unlocked, it gets the right of the communication restore the factory default value and communication clear the record information.If there is no communication within 5 minutes,the access right is invalid.Re-unlock so as to get the access right.

Read inverter status :(Read-only)

Status word address	Status word function
3000H	0001： Forward rotation
	0002： Reverse rotation
	0003： Stop

Parameters locking password check: (If the return is the 8888H, it indicates the password checksum pass)

Password address	Contents of input password
4000H	*****

Parameter locking command :(Write-only)

Address of locking password command	Contents of locking password command
5000H	0001： Locking system command code

Digital output terminal control: （Write-only）

Command word addr.	Command function
6000H	BIT0： Output control BIT1： DO2 output control BIT2： RELAY1 output control BIT3： Reserved BIT4： DO3 output control

Analog output AO1 control: (Write-only)

Command word addr.	**Command function**
7000H	0～7ffff refers to 0%～100%

Pluse output control: (write-only)

Address of locking password command	Contents of locking password command
A000H	0～7fff refers to 0%～100%

Inverter fault description:

Inverter fault address	Inverter fault information
8000H	0000： No fault 0001： Reserved 0002： Speed-up over current 0003： Speed-down over current 0004： Contant over current 0005： Speed-up over voltage 0006： Speed-down over voltage 0007： Contant speed over voltage 0008： Buffer resistance overload 0009： Under-voltage fault 000A： Inverter overload 000B： Motor overload 000C： Input phase fault 000D： Output phase faulure 000E： Module overheating 000F： External fault 0010： Communication fault 0011： Contactor fault 0012： Current detection fault 0013： Motor tuning fault 0014： Reserved 0015： EEPROM read and write fault

Inverter fault address	Inverter fault information
	0016： Reserved 0017： Earth short circuit fault 0018： Reserved 0019： Reserved 001A： Running time arrival fault 001F： Software over current fault 0028： Fast current limiting 0029： Swithing motor fault

Descriptive data of communication fault information (fault code)

Communication fault address	Fault function description
8001H	0000： No fault 0001： Password error 0002： Command code error 0003： CRC check error 0004： Invalid address 0005： Invalid parameter 0006： Parameter change invalid 0007： The system is locked 0008： Being restoring parameters

6、Group FA Communication Parameter Description

FA-00	**Baud rate**		**Factory default value**	5
	Setup range	0	300BPS	
		1	600BPS	
		2	1200BPS	
		3	2400BPS	
		4	4800BPS	
		5	9600BPS	
		6	19200BPS	
		7	38400BPS	

This parameter is used to set the the data transfer rate between the host computer and the inverter.

Caution: The baud rate of the host computer and the inverter must be consistent.Otherwise, communication is impossible. The higher baud rate is, the faster communication is.

FA-01	Data format		Factory default value	0
	Setup range	0	No check:data format<8,N,2>	
		1	Even parity check :data format <8,E,1>	
		2	Odd parity check : data format<8,O,1>	

When use the parity or odd parity, the length of each byte is 11 bits, which includes a start bit, 8 data bits, 1 parity bit and one end bit.

When use the no check, the length of each byte is 11 bits, which includes a start bit, 8 data bits, 1 parity bit and 2 end bits. The data format of the host computer and the inverter setup must be consistent, otherwise, communication is impossible.

FA-02	**Local addr.**	Factory default value	1
	Setup range	0 to 247,0 is broadcast address	

The function code used to identify the local address of the inverter.The local address is unique (except the broadcast address), which can realize the broadcast function of host computer.

Caution: When the local address is set to zero, that is the broadcast address, which can only receive and perform the broadcast address of host computer but not respond to the host computer.

FA-03	Response delay	Factory default value	2ms
	Setup range	0 to 20ms	

Response delay: It refers to the interval time from the inverter finishes receiving data to sending data to the host machine.If the response delay is less than the system processing time, then the response based on the time delay of the system processing time.If the response delay is more than the system processing time, after the system processes the data, it should be delayed to wait until the response delay time is up, then sending data to host machine.

FA-04	Communicaton overtime		Factory default value	0.0 s
	Setup range	0.0 s（Invalid），0.1 to 60.0s		

When the inverter can not receive the communication signal,the inverter will report the communication overtime fault（Err16）.

When the function set to 0.0 s, the communication overtime parameter is invalid.When the function set to 0.0 s, the communication overtime parameter is invalid.

At normal circumstances, it will be set as invalid. If in the continuous communication system, set the second parameter, you can monitor the communication status.

Warranty Agreement

1、 The warranty period of the product is 18 months （refer to the barcode on the equipment body）.During the warranty period, if the product fails or is damaged under the condition of normal use by following the instruction.Our company will be responsible for free maintenance.

2、 Within the warranty period, maintenance will be charged for the following reasons:

A、The damage caused by improper use or repair/modification without prior permission.

B、The damage caused by fire, flood, abnormal voltage, other disasters and second disaster;

C、The hardware damage caused by dropping or transportation upon the procurement.

D、The damage caused by the improper operation;

E、The damage or fault caused by the trouble our of the equipment (e.g. external device)

3、 If there is any fault or damage to the product, please correctly fill out the Product Warranty Card in detail.

4、 The maintenance fee is charged according to the newly adjusted Maintenance Price List by our company.

5、 In general, the warranty card will not be re-issued.Please keep the card and present it to the maintenance personnel when asking for maintenance.

6、 If there is any problem during the service, please contact the agent of our company or our company directly.

7、 This agreement shall be interpreted by Shenzhen Inovance Technology Co., Ltd.

Shenzhen Inovance Technology Co., Ltd.

Service Center

Address: Block E, Hongwei Industry Park, Liuxian Road, Baocheng No. 70 Zone, Bao'an District, Shenzhen

Tel: 400-777-1260 **P.C.: 518101**

网址：www.inovance.cn

Inovance

Product Warranty Card

<table>
<tr><td rowspan="3">Customer information</td><td colspan="2">Add. of unit:</td></tr>
<tr><td rowspan="2">Name of unit:

P.C.:</td><td>Contact person:</td></tr>
<tr><td>Tel.:</td></tr>
<tr><td rowspan="3">Product information</td><td colspan="2">Product model:</td></tr>
<tr><td colspan="2">Body barcode (Attach here):</td></tr>
<tr><td colspan="2">Name of agent:</td></tr>
<tr><td>Failure information</td><td colspan="2">(Maintenance time and content):

Maintenance personnel:</td></tr>
</table>